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Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY

ACTION UNDERGROUND

Billy Regendenz and Elmo Borne, employes of the Home Telephone & Telegraph Co. of Ft. Wayne, Indiana, take time out from their cable splicing work in a manhole for this picture.

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MANAGEMENT • PLANT • TRAFFIC • COMMERCIAL • LEGAL • ACCOUNTING

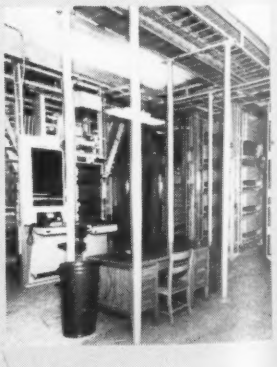
Who else wants to save money?

CENTRAL OFFICE TROUBLE REPORT—1954

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
XY Switches	3	0	4	4	0	0	0	1	0	0	2	2
Linefinder Toll	9	0	1	0	0	1	4	0	1	1	1	0
Toll Selector	0	0	0	1	4	0	0	0	0	0	0	0
Local Selector	5	1	1	3	1	3	4	0	2	1	5	0
Connector	0	3	3	2	2	1	1	0	2	0	0	0
Misc.	8	16	14	8	10	13	6	21	12	11	7	3
Totals	25	20	23	18	17	18	15	22	17	13	15	5

Total 208

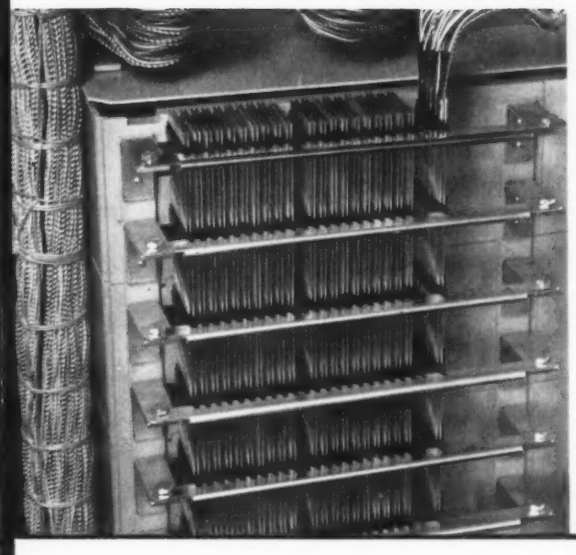
These actual figures show how an XY® Dial System drastically reduces maintenance costs.

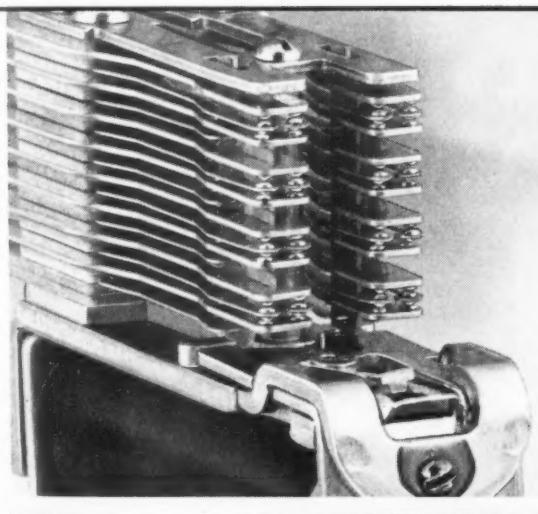


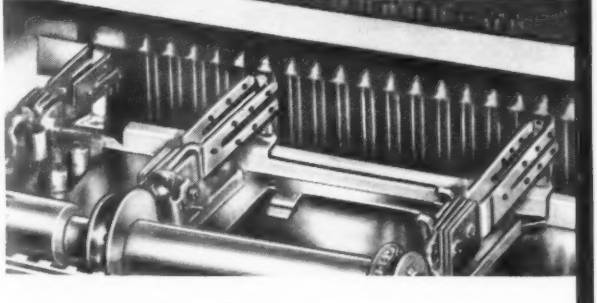
TROUBLE REPORTS FOR THE ENTIRE YEAR 1954 show that this 2500-line XY Dial System averaged only 4 inside trouble calls a week! Note that the switches themselves operated almost entirely without attention for six months (May through October).

This exchange, serving 5000 terminals, is at the Junction City Telephone Company, Junction City, Kansas, and was cut into service on September 5, 1953.

3 vital reasons why an XY System cuts your maintenance costs







1. VERTICAL WIRE BANKS employ a principle your wife is very familiar with: dust and dirt will not collect easily on a vertical surface. Thus, you get more positive switching contact, with a minimum of interference. No feather dusters or scrub brushes needed to remove dust and dirt.

2. TWIN CONTACTS are standard Stromberg-Carlson practice on all switches and relays. This more than doubles efficiency. On relays alone, it reduces the probability of failure approximately 23 times that of single contacts.

3. SWITCH WIPER AND WIRE BANKS will *never* need replacing. They are engineered to outlast the system itself.

SAVING DOLLARS on maintenance is just part of the XY story. To learn how an XY Dial System can also increase your total revenue—perhaps double the efficiency of your operation—call your Stromberg-Carlson representative.

STROMBERG-CARLSON® COMPANY

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FLASHES AND PLUGS

IMPARTIAL JUDGMENT. In Keokuk, Iowa, a 27-year-old man phoned the police station from a tavern the night of Aug. 17, asking that a policeman be sent right over.

When patrolmen arrived, the man asked them to deliver a message to his wife saying he was sober.

The police disagreed.

Next day, the man was fined $10 and given three days in jail by the justice of the peace for intoxication.

•

LEVITY IN THE SUGGESTION BOX. An observer on the West Coast has reported to TELEPHONY that in contract negotiations between union and Pacific Telephone & Telegraph Co. representatives, the union set up a tape-recorder to preserve the proceedings for further study.

Subsequently it was advertised to Pacific T&T employes that they might dial a certain number to obtain a play-back of the union statements, and another number for those made by the company.

Some wag has suggested, "If the going gets tough in the negotiations, let the two tape-recorders work it out."

•

DRESS REHEARSAL. People who make extra work in the summer are about as welcome as a fish hook caught in one's jacket. Yet the following really happened in Oklahoma City, Okla., in August.

"I just saw a kangaroo on Northeast 23rd," a caller, vocally shaken, telephoned police.

The police dispatcher hopped to his duties, setting off a full-scale safari of patrolmen headed by a city park zoo director.

The zoo chief soon spotted their quarry, hiding in the brush, and jumped it.

The animal turned out to be stuffed, apparently planted by a prankster.

•

BAD NEWS TRAVELS. In Houston, Tex., a local court justice ruled the evidence was not sufficient to convict a chemical company for air pollution.

"But I'm sure going to catch heck from the ladies in that area," he remarked. The telephone rang just as he finished the statement.

He hadn't listened long before his face got red. He said little during the call, offering several apologetic rejoinders. Then he hung up.

"My wife," he groaned. She'd just heard about the verdict.

CIRCULATION

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Since 1901

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IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR

Britain's government-owned communications department deplores inadequacy of depreciation reserves based on original cost, to replace equipment at present high prices. . . . More realistic than some U. S. regulatory commissions.

QUITE A BIT has been said in this department about the inadequacy of depreciation reserves based on strict original cost, to replace equipment at present high prices. The experience of foreign government telephone systems as well as of the privately-owned telephone industry of the United States has been cited. Recently there came to the attention of this writer an annual report of the world-wide communications system owned and operated by the British Government. This is known as Cables and Wireless.

From this report, there is clearly inferred a recognition of the fact that depreciation reserves based on original cost account just do not take care of economic depreciation. It also clearly infers that part of the company's assets have been used to set up current cost or economic depreciation. Unfortunately, the earnings from the cable system were inadequate for that purpose.

The report (for the year ending Mar. 31, 1955) states on that point:

"The drive to promote efficiency and economy has continued and will not be relaxed. Cumulative savings effected over the last five years are now running at the rate of approximately £250,000 per annum. This saving is substantial but is little more than the increase of staff costs last year. Under the inflationary conditions prevailing in so many parts of the world where the company operates, it is to be feared that running costs will go on rising and that they cannot be matched by a corresponding rise in revenue at present tariffs, despite steps taken to stimulate traffic.

"In addition, as mentioned in the last report, the company is faced with the problem of financing renewals of the cable system. The company has been able to build up a reserve out of profits towards the cost of replacing its cable ships and shore installations at current prices, but has not had a large enough profit margin to do the same, as it would have liked, in respect of the cable system; and general capital reserves are insufficient for the purpose.

"It is evident that, if operating costs rise further, and given the necessity to renew the cable system at current prices, the company will be unable to maintain even its present moderate profit level unless revenue can be increased."

As already noted in this department, the British Post Office for some years has set up supplementary reserves for depreciation (in addition to original cost base accruals) to take care of necessary telephone plant replacement at prevailing higher prices. The same is done in Sweden. It would appear, therefore, that our socialized government-operated communication services are more realistic about inflation and its resulting effect on the attrition of plant investment, than some of the federal and state regulatory commissions in the United States. It probably makes a difference whether the losses occur in properties for which the agency is managerially responsible, as compared with laying down rules for somebody else's property.

Iowa Goes On a Value Basis

At the recent meeting of the Section of Public Utility Law of the American Bar Association, Walter E. Craig, counsel for the Mountain States Telephone & Telegraph Co. made an excellent summation of developments in the field of the law of telephone company regulation during the past year. Among other most thoughtful observations, Mr. Craig pointed to the considerable number of state court decisions which have turned to a fair value rate base (as distinguished from strict original cost) in postwar utility rate cases.

Obviously, there has been a trend setting in during this period. And now comes another state—if a decision of a lower district court prevails on appeal, if any. The latest state is Iowa—which, strangely enough is one of two states in the union without a regulatory commission having jurisdiction over public utility rate fixing.

In Iowa, the utilities generally fix their own rates in the first instance. But these are subject to "home rule" rate regulation by the larger cities in the form of municipal ordinances. It was such an ordinance, by the city of Fort Dodge, which the Iowa District Court of Webster County has declared constitutionally invalid on grounds of confiscation, with respect to the rates for residential gas service charged by the Iowa-Illinois Gas & Electric Co. It is a lengthy decision, written by Judge Harvey Uhlenhopp and it is rather carefully documented. But it says some very pithy and forthright things about rate base justification which apply just as much to telephone companies as to gas utility companies.

The case arose when the gas company attempted to increase its rates under bond. The city of Fort Dodge by ordinance of its city council attempted to suspend this increase and the company's suit in court for an injunction to prevent the city from interfering. This was granted. In the process, the court ruled in favor of a present fair value rate base, and specifically repudiated a rate base constructed entirely on original cost accounts. The court allowed a return of 6 per cent on the fair value rate base, which Judge Uhlenhopp defined as follows:

"Rate-making is a process of compromising the conflicting interests of the ratepayers and the stockholders. While rules have been laid down which purport to direct the inquiry unerringly

to the precise answer, actually fair value is 'nothing more than some average of dissimilar factual valuations of private property.' The answer is a composite figure. It is not founded on this or that method alone. The owners are not given the highest amount, nor the consumers the lowest. A bargain is struck.

"Other methods of getting at the proper rate are not acceptable—at least in these changed times. It is said that property valuation is overemphasized, that rates should be set on the basis of what investors might expect from the enterprise. But how would investors know what to expect until the value of the property involved is ascertained? Then the 'end result' test is put forward—the rate should be approved if it appears 'fair.' But fair by what standard? The fair value doctrine is uncertain enough without throwing away all yardsticks. The end result test may be acceptable where a high federal commission has pondered the problem. But, in Iowa, city and town councils are obliged to do the job. Consideration only of the end result would cast us upon an uncertain sea and decision would not be by rule but by individual conception of justice."

Turning to the original cost doctrine, the court found it too rigid in the light of drastic price changes which we have experienced in the United States, especially since World War II. The opinion continued:

"Should the utilities be required to

REA Makes $1,232,000 Telephone Loans in Four States

Four telephone systems in Michigan, Missouri, Texas and Colorado borrowed a total of $1,232,000 from the REA during the period Aug. 21-27, the United States Department of Agriculture announced on Aug. 30. The loans will provide modern dial service in rural areas served by the borrowers. Details of the four loans follow:

Delton (Mich.) Telephone Co., a new borrower, was allocated a loan of $486,000 on Aug. 24. The company is planning a modern telephone system to serve 1,439 rural residents in Barry and Allegan counties. It now provides magneto service to 789 subscribers.

New automatic central office buildings at Delton and Pine Lake will serve the expanded system. Of the existing 163 miles of line, 12 miles will be retired, 5 continued in use and 146 miles rebuilt. In addition, 53 miles of new line will be added to the system and the present headquarters will be remodeled and enlarged. These changes will offer improved service to the present subscribers and initial service for 651 farm families and other rural residents now without telephones. The borrower is planning service without toll charge between the two exchange areas. Subscribers in the Delton area will have similar service with the towns of Banfield and Hickory Corners.

William G. Smith is president and Delos Flower is manager of the Delton company.

*

Golden City (Mo.) Telephone Co., a new borrower, on Aug. 24 was extended a loan of $270,000 to improve and extend rural telephone service in Barton, Dade, Jasper and Lawrence counties.

At this time the Golden City company is furnishing magneto service. With its loan, it plans to provide modern telephone facilities for 676 rural subscribers in its operating territory.

A new automatic central office and headquarters building will be constructed in Golden City to serve the area. Of the existing 57 miles of line, 8 miles will be retired and 49 miles rebuilt. About 161 miles of new line will be added to the system.

The REA loan will result in improved service for the 358 existing subscribers and initial service for 318 rural families now without telephones.

William M. Dagby is president and manager of the Golden City company.

*

Santa Rosa Telephone Cooperative, Vernon, Texas, on Aug. 24 was allocated $191,000, its fourth loan. The borrower will use the new funds to expand its service area into nearby Cotton County in Oklahoma where it will provide automatic service to an additional 293 rural subscribers, 253 of them now without telephone service.

As a nucleus for the new service, Santa Rosa proposes to acquire the Devol, Okla., exchange now being operated by Southwestern States Telephone Co. of Brownwood, Tex. About 40 rural families are now receiving magneto service at Devol. The borrower plans to construct a new dial exchange at Randlett, Okla., to serve this portion of its system. It will use 14 miles of the existing line, retire 12 miles and add 166 miles of new line in the expanded area.

With its four REA loans, totaling $878,000, Santa Rosa will be able to offer new and improved service to 1,380 subscribers in Foard, Hardeman and Wilbarger counties in Texas, and Cotton County, Okla. The expanded system will consist of 822 miles of line and nine exchanges.

REA-financed dial service is now available in the Farmers Valley, South Crowell, Goodlet, Medicine Mound, Charlie, Thalia and the White City areas, and about 500 subscribers are now connected in those communities. The Olkaunion exchange is under construction. Randlett, Okla., in the Aug. 24 loan, is the ninth exchange area.

Richard Kempf is president and Carl G. Freeling is manager of the Santa Rosa cooperative.

*

The Eagle Valley Telephone Co., Eagle, Colo., received a loan of $285,000, on Aug. 25 to improve and extend rural telephone service in Eagle and Garfield counties.

The company, a new borrower, is now providing common battery and dial service to 418 subscribers over 163 miles of line. With the funds made available in the loan it proposes to convert the system entirely to automatic operation, and add facilities to serve 65 rural families now without telephones.

Of the existing mileage, 8 miles will be retired, 88 continued in use, and 67 rebuilt. About 138 miles of new line will be added to the system.

A new automatic central office headquarters building is proposed to replace the existing common battery facilities at Eagle. New automatic equipment to permit full selective ringing will replace the present automatic facilities at Gypsum and Wolcott. The borrower plans to continue service without toll charge among the three exchange areas. The completed system will consist of 293 miles of line.

Meredith H. Morgan is president and manager of the Eagle Valley Telephone Co.

put up their property in terms of the high old unit while receiving the cheap new unit at the counter? Must this utility value its 1882 mains, still in service, in 1882 dollars? Such a result practically gives the consumer the benefit of ownership. If the consumers wish to own the property they should buy it outright. Then the ostensible gains and losses resulting from price fluctuations will be theirs. But adherence to original cost when the property is, in fact, privately owned neither gives the stockholder a real income in high times nor the ratepayer a real rate in low. Fair value tends to keep the income and the rate stable in terms of realities. Utility returns and the cost of utility service remain more constant in terms of hours of labor and bushels of corn."

How about the argument that original cost "stabilizes" the utility income —makes its common stock as good as a bond in any other kind of industry? What effect does this have on the utility's incentive to expand and improve its services, technically and efficiently? The Iowa judge said on this:

"The stockholder is a risk-taker, not a creditor. The capital structure of the utility enterprise includes a proportion of risk capital, and risk-takers will demand to go forward with the economy. To think that the stockholder takes no risk because the utility has a captive market is to forget numerous companies which failed in the not distant past with stockholders wiped out and bondholders partly unpaid—hard times, decadent communities and industries, or changes in the art. What happened to the street railway and manufactured gas? Who knows how long natural gas will be used or available, or whether Fort Dodge will continue a profitable market? If things go bad and the utility fails, there will be no ratepayers at hand to make sure it gets back its original cost. The regulatory lag, the danger of premature obsolescence, the differences in methods of regulatory bodies (of which indeed the utility complains here) are other risks the owners face. It is true the utilities have the privilege of franchise. Their rate of return is correspondingly low. But the franchise does not guarantee success—only a fair race."

Original cost makes regulation easy, the court admitted, but "it gives away something more valuable." It prevents utilities from going forward with other industries, ties them in a "regulatory straight-jacket" and becomes a "dull mechanical thing." The utility management is forced to ask itself: "Why advance and take chances?" Will such utility management be encouraged to pay the present high prices for equipment "when it sees today's return paid in terms of yesterday's dollars?" As to usual objections against the uncertainty of the fair value approach, the court's opinion stated:

"The charge is true that fair value is not a single figure to which one is unerringly led by the application of a certain formula. It is a judged figure. This disturbs those whose desire for certainty requires everything to be settled mechanically. The result obtained by inspection of accounts for original cost is certain, but it may also be unfair or otherwise undesirable. Everyone likes certainty, but there are areas in the law where justice calls for judgment and opinion. It is not always possible merely to add up numbers. The best we can do in these instances is to admit only intelligent opinions and then select what appears the most reliable among them.

"Original cost or the most recent fair value figure may be acceptable in some cases without a new reproduction cost study. Not every flutter in price calls for full-scale revaluation. It is only where the swing is so wide as to make the inequity rather clearly appear that a general overhaul is indicated.

Evidently the court felt that the utility rate case before it was a good example of the point noted above. The property was last valued in 1939. Prevailing prices might then have been *less* than original cost. But in any event, the court felt that the property "has been here long enough to justify the utility's demand that another look be taken."

Cutting Debt Obligation

It is quite commonplace in telephone rate cases these days to see state commissions penalizing companies for not having larger debt structures than they actually have. In a number of cases the commissions have assumed — in order to reduce the allowable return— that the telephone company had a larger (but lower cost) debt obligation, and a smaller amount of stock capitalization, than was actually the case.

The trouble with high debt structure is that it increases the amount of inflexible fixed debt obligation. If a utility company does not earn enough to pay dividends on common stock—it passes the dividend with regrets, but without liability. That is the bargain the stockholder made. But no utility company can ever pass up payment of interest on bonds without risking receivership, because it is just like a mortgage—subject to foreclosure on the property.

Continued over a long enough period, this encouragement of utilities to assume larger debt obligations can penalize initiative and undermine credit. That is what happened to the railroad industry decades ago and some are still struggling with the problem.

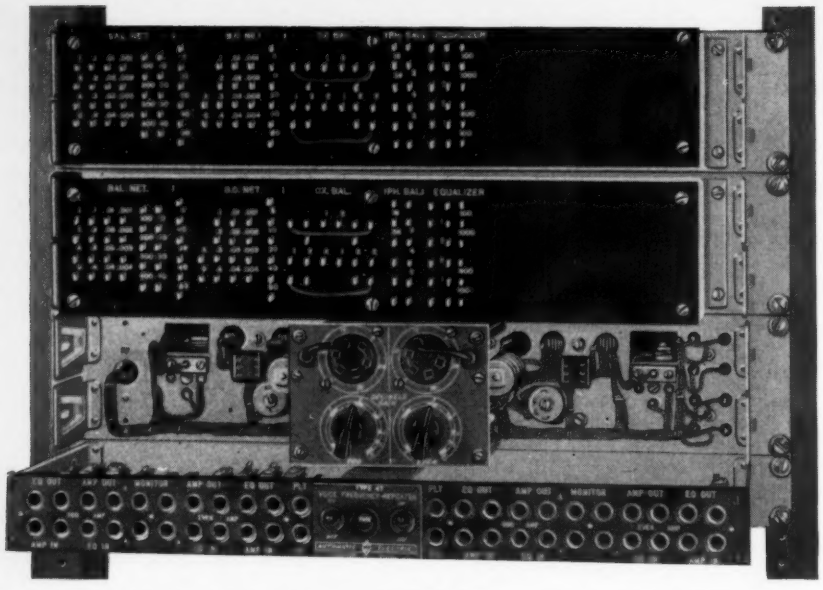
Last week the Baltimore & Ohio Railroad Co. made an interesting "come back" from under its pile of bonded indebtedness which at one time almost buried the line. The company was able to arrange with the underwriters to offer an issue of 280 million dollars in bonds of three maturities bearing an interest of only 4 per cent. This signalizes the final achievement of a goal which has been the dream of the railroad under successive regimes for almost a generation. Indeed, if the full story were told, it might truthfully be said that the dream has been cherished since the 1890's.

During the early years of this century, the Baltimore and Ohio was handicapped by a debt which, if not too large, was illogically distributed to such an extent that servicing it often swallowed up funds that should have been used for maintenance and extension of the road's equipment and facilities. With the onset of the depression its seriousness returned in almost overwhelming form.

It was in this trying period that the strength, the resourcefulness and above all the high character of the late Daniel Willard paid off. The whole world of transportation was in a turmoil. Even the ordinarily staid Interstate Commerce Commission began talking in what railroad men regarded as revolutionary terms. Interestingly enough, it was during this trying time that the Baltimore and Ohio, instead of drawing back, saw that the time was ripe for expansion and proceeded to act. Control of important smaller roads that fitted well into the system was acquired and the foundations laid for the remarkable achievement of the war period.

The basic need, of course, was to reestablish the credit of the road on the firmest possible foundation. This was done, in the first place, by tip-top maintenance and, secondly, by paying off as rapidly as possible short-term obligations, including, of course, the loan from the Reconstruction Finance Corp.

The net result of this was a renewed interest of investors in the future and a willingness on the part of the owners of the older obligations to exchange them for others which, though they might return a lower rate of interest, were more rationally arranged. Thus, for the first time in many years, the Baltimore & Ohio railroad is in a position to put its financial house in better order. Bankers may call this one of the striking achievements of present-day American business. It is also the fruition of a long-range plan in which character and determination played leading roles.



The top panels on this repeater contain several binding posts which may be strapped together when placing the equipment in service. From left to right, these terminals connect to the balancing network, building out network, CX balance and equalizer. The bottom strip contains a number of jacks which give access to the input and output of the amplifier and to other points in the circuit.—Photo courtesy, Automatic Electric.

Voice Frequency Repeaters

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By HAROLD B. McKAY

PART I—*Amplifiers*

VACUUM TUBE amplifiers have been used for a long time on long-line telephone circuits, and the operation of these repeaters is a familiar subject with most telephone men. However, recent circuit improvements have resulted in the manufacture of the "negative impedance" repeater which uses electrical principles which were not previously used in the telephone field. These repeaters are low enough in cost to encourage their application in places where repeaters would not have been considered previously. In some locations on new installations, it may prove economically advisable to place cable of smaller gauge and make up the transmission loss with repeaters, rather than use a larger gauge cable.

Because these new repeaters find practical use on circuits as short as 10 or 15 miles of loaded lines and even shorter lengths of non-loaded, it is probable that many will be placed in service, and that more men will be trained in their maintenance. Because of the new principles involved, it seems appropriate at this time to review our whole concept of repeaters. These articles will treat first with the older types of repeaters with descriptions of methods of amplification, ringing, and supervision. The last chapters will deal with the "negative impedance" types of repeaters and present an explanation of their operation.

Repeaters are necessary on long telephone lines to offset the losses caused by the natural characteristics of the line. These losses gradually attenuate the voice currents until the

Reprints Will Be Available

This is the first of a series of nine articles—six on "Voice Frequency Repeaters" and three on "Power Supplies for Repeaters and Carriers."

The author, Mr. McKay, will be remembered for his three series of popular articles on "Principles of Microwave Operation"; "Electrical Principles Used in Carrier Systems"; and "Corrosion of Underground Cables" and other articles published in TELEPHONY.

These repeater articles will be invaluable as employe training material and if firm orders are received for a sufficient number of reprints (in booklet form) to justify reprinting, they will be available following publication of the nine articles.

Telephone companies desiring reprints are asked to enter their reprint orders during publication of the articles. Prices of the booklet form of reprint are as follows:

1- 100 copies	each	$.85
101- 200 copies	each	.80
201- 300 copies	each	.75
301- 400 copies	each	.70
401- 500 copies	each	.65
501-1,000 copies	each	.60
Over 1,000 copies	each	.50

volume of the voice drops below a satisfactory level and transmission is poor.

These losses are caused by the actual resistance of the wire used in the line, and by the condenser effect between the two wires. The actual resistance of the line is the lesser of the two difficulties. This can be offset by using wire of larger gauge, hence less resistance. To a certain extent it can also be offset by using higher voltages (higher transmission levels).

The condenser, or capacity loss, is caused by the fact that the two wires act like plates of a condenser; and as a condenser passes alternating current, the pair of wires acts like a shunt across the voice currents. The longer the line, or the higher the frequency of the currents being transmitted, the greater this shunting effect will be. Therefore, if a line is long enough, it will become practically impossible to transmit voice over it.

This discovery was made very early in the development of the telephone. An experiment was conducted in which an attempt was made to send speech over the Atlantic Ocean telegraph cable. While the cable transmitted dc telegraph signals very well, it would not transmit any voice signal at all. Yet, even the primitive telephone instruments could be made to talk through a straight dc *resistance* of a value which equalled the Atlantic cable.

This condenser effect, which shorts out the voices, can be offset by the use of loading coils in some circuits. Electrically, the effect of a coil in a circuit is the opposite to that of a condenser. A condenser retards the voltage in a circuit, while a coil retards the amperage. Together they cancel each other's effects. Therefore, placing small coils in series with telephone lines will greatly extend the range of the circuit. These coils must be of correct value and installed at the correct places along the line in order to work.

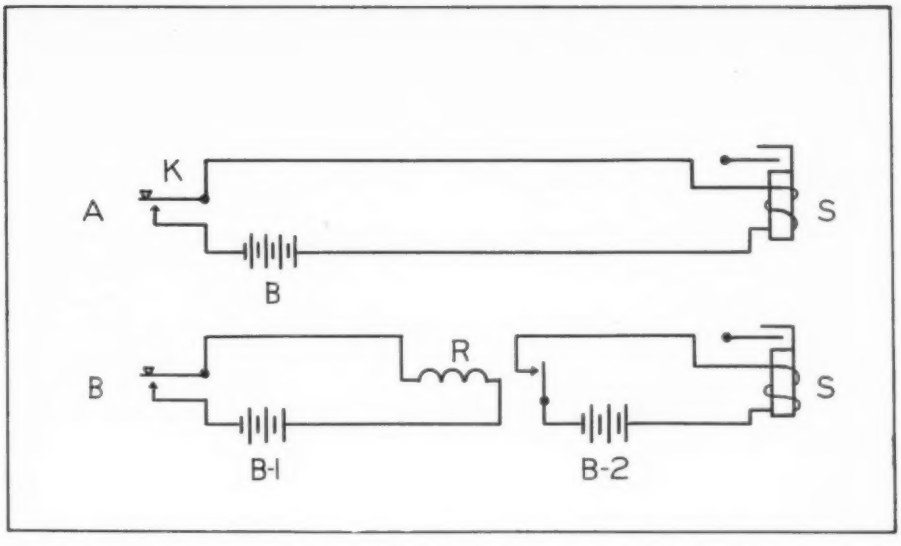


Fig. 1.1. Effectiveness of the simple telegraph circuit A is limited by the power of the battery B and the resistance in the line. It will work over a longer distance if somewhere along the line a relay R is placed in the circuit. The contacts of this relay give a fresh start to the circuit using the new battery B. The relay will "repeat" the dots and dashes sent by the key and send them on to the sounder S. A repeater is a device for supplying fresh power to a circuit when the original signal becomes weak with the distance traveled. (All drawings in this series of articles are by Victor Willard.)

Higher Voltage

It was mentioned above that the effect of line loss could be offset by using higher voltages or transmission levels. A repeater or amplifier actually has the effect of supplying a higher voltage; but in order to understand the negative impedance repeater, which will be described later, it is necessary that a good concept of this increased voltage effect be established in mind.

In a simple telegraph circuit, wherein the closing of a key at one end will operate a sounder at the other, the connecting line could be made so long that the resistance would prevent enough current being sent over it to operate the sounder at the distant end. This problem could be met by increasing the voltage of the dc battery which operates the system. By Ohm's law, the more resistance in a circuit the less current; but the higher the voltage, the more current will flow. Therefore, in the telegraph circuit either lowering the resistance, such as by using larger wire, or raising the voltage, will permit enough current to flow to operate the sounder. Another method of offsetting a long telegraph line is the use of a more sensitive sounder which requires less current. In actual practice a relay is used which operates on less current than the sounder, but whose contacts would repeat the dots and dashes in a local circuit to operate the sounder. This is probably why the word repeater was chosen for this type of device.

While it is sufficient to raise the dc battery voltage on a telegraph, because it is the dc which carries the signal, voice currents are alternating currents which present a different problem. The alternating voice currents are changing constantly as the user speaks. Therefore, in order to raise the voltage of the voice currents, something must be used which will instantly follow the changes of

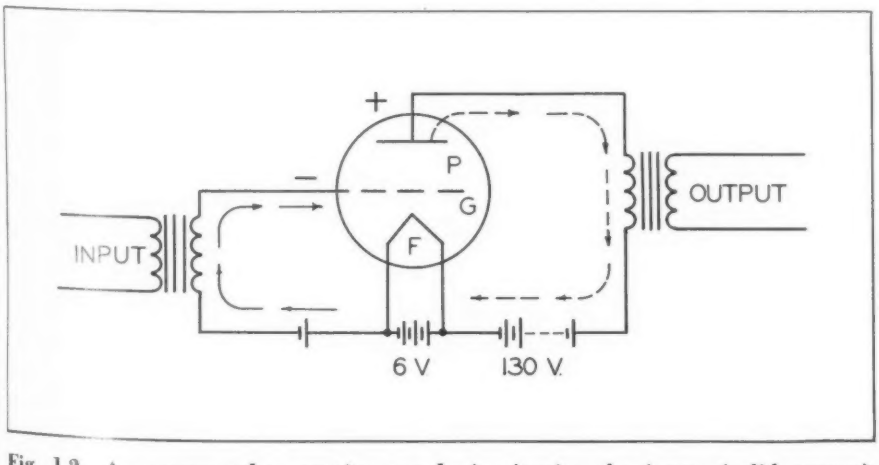


Fig. 1.2. A vacuum tube contains two basic circuits, the input (solid arrows) and the output (dotted arrows). The voice or other ac coming out of the right hand side of the input transformer causes the voltage on the grid G to rise and fall. The grid becomes more or less negative with respect to the filament F as the strength and frequency of the input voice currents change. The output current from the plate P to the filament F is a replica of the input current, but is amplified, hence is greater in magnitude.

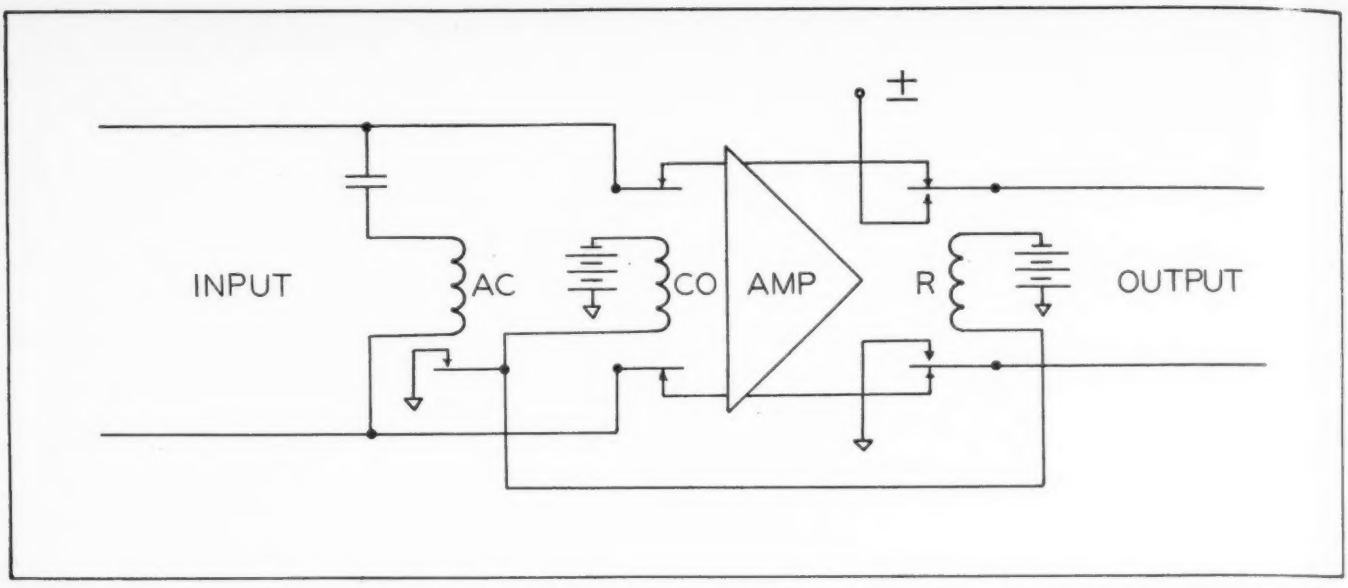


Fig. 1.3. A voice frequency repeater may consist of an amplifier AMP, with relays to pass switching functions around it. A ringing signal at the input would operate relay AC, which in turn would operate CO and R. The CO relay would cut off the repeater amplifier, the relay R would pick up fresh ringing power and ground at the repeater office and send it along to the output.

both voltage and frequency which the voice causes.

In the telegraph, only two conditions exist—the key is either open or closed —the current either flows or it does not. Therefore, a simple relay can be used to repeat this information to the next section of a line. A relay, like the telegraph key and sounder, can also only transmit two kinds of information —it is either up or down—nothing else.

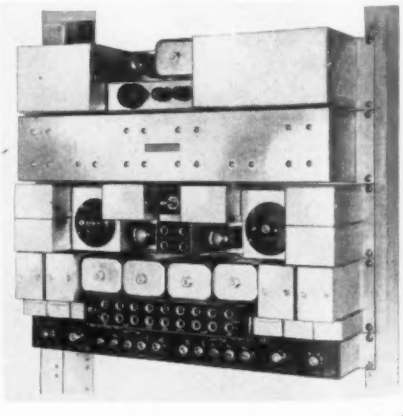
Vacuum Tube

To duplicate this effect with a voice current which has changing voltage and frequencies, an amplifier is used. The amplifier is built around the vacuum tube which functions as follows:

The tube is composed of a filament or cathode ("F" in *Fig. 1.2)* which is heated by a low voltage battery, usually six volts. Particles of negative electricity called "electrons" are pulled off of this heated element by the plate "P." The electrons are attracted to this plate because the plate has a higher voltage, usually 130 volts, connected to it. This is a positive voltage which attracts the negative electrons.

The electrons, in travelling to the plate, must travel through a small piece of wire mesh called the grid (G), which has a small negative voltage (two or three volts) on it. This grid is actually very close to the filament, hence has a greater influence on the electrons than does the plate. In a manner of speaking, one might say that the grid gets its chance at the electrons first, therefore, has a greater effect than the plate.

In actual operation the voice currents, weak after a long trip over a telephone line, are introduced at the input *(Fig. 1.2)*. The voice voltage developed in the input transformer adds and subtracts, as the speaker talks, to the small negative dc voltage already on the grid. This makes the electron stream vary greatly. In turn, this makes the current flowing through the output transformer vary greatly.



This typical repeater is composed of the following units (top to bottom): Power supply unit; filter assembly; repeater (amplifier); line unit (ringing feature), and balance network equipment.—Photo courtesy, Kellogg Switchboard & Supply Co.

The result of this is that the voltage of the output transformer varies greatly.

All together, this means that a weak voice voltage or current is "amplified" and made to become a much larger

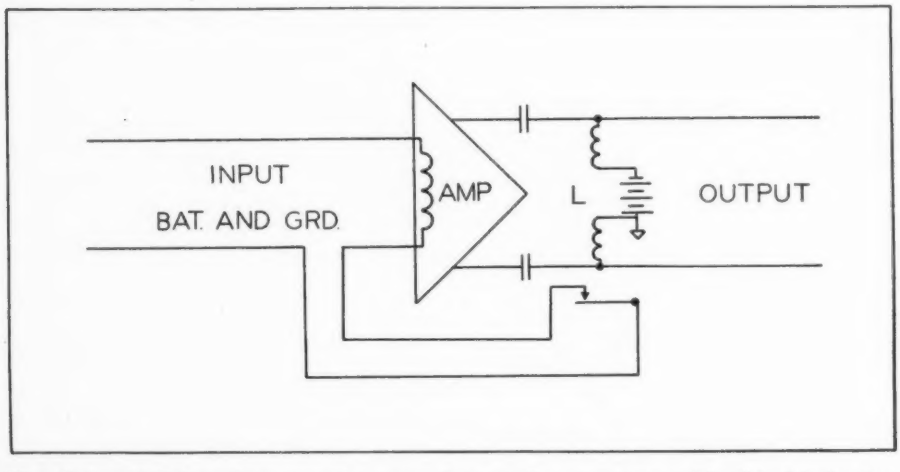


Fig. 1.4. Dial impulses may be passed around a repeater with this kind of a circuit. Here the subscribers loop on the output holds up the L relay. The contacts of this relay close the loop through the input of the amplifier back to the central office. Dial pulses would cause the relay to release and reoperate, relaying the pulses to the input circuit.

voltage at the output. Note, however, that this greatly increased output voltage will vary directly as the voice varies. If the speaker talks loud and the voltage goes up, the output voltage will rise. If he changes the pitch (frequency) of his voice, the output frequency changes with it exactly.

The vacuum tube amplifier, then, does exactly what the relay did for the dc telegraph system. It receives a weak voltage in step with the incoming signal, so that the output is merely a "repetition" of the input, but with more power.

One other important fact can be developed from *Fig. 1.2* at this time. Note the two arrows on the drawing. The solid arrow to the left represents the general direction of the input voice voltage at a given instant. The dotted arrow shows the direction taken by the amplified output current. The important fact is that each flows in a distinct path, each of which is separate from the other. This is a basic vacuum tube circuit, and most tubes are connected in this manner. The negative impedance repeater, which will be discussed in a later chapter, is quite different in this respect.

(A more extensive explanation of the behavior of condensers, coils, and vacuum tubes will be found in the author's article on "Electrical Principles used in Carrier Systems," which is available as a reprint from TELEPHONY.)

Signaling Methods

A telephone circuit requires more than a means for transmitting voice. Direct current functions such as dialing, switch hook supervision, seizure and release signals, as well as low frequency alternating currents used in ringing must be sent over the same wires that carry the voice. The amplifier or repeater shown above has its input and output circuit separated, hence no dc can be made to flow from the input to the output. Further, the transformers are usually of a type designed to transmit only voice frequency, and would probably shunt down any ringing current that would be applied to the circuit.

To provide for these features, the amplifier may be combined with relay equipment of the type usually called "long-line equipment." In effect, these relay circuits "repeat" the other functions in the same manner as a telegraph relay repeater, but do so in a manner which by-passes the amplifier. It might be said that these relay circuits actually disconnect the amplifier temporarily while the dialing or ringing is taking place.

A typical circuit is shown in *Fig. 1.3*. In this drawing, as with all subsequent drawings, the triangle represents an amplifier. The base of the triangle always represents the input, while the apex represents the output. Therefore, the triangle can be thought of as a point or arrow which amplifies in the direction it is pointing.

Fig. 1.3 represents a repeater at an intermediate central office on a long circuit. The relays shown are for the purpose of relaying or repeating a regular ringing voltage at this repeater point. If ringing voltage is applied to the input, the relay AC will operate. This will operate relay CO, which will cut off the circuit to the input transformer in the amplifier. If not cut off, this transformer (shown in *Fig. 1.2)* would act as a shunt to the ringing current, and make less current available for steady operation of relay AC.

Relay AC also operates relay R, which disconnects the output of the amplifier from the outgoing line, and places ringing current on the line instead. This relay circuit performs a standard long-line equipment function. That is, it replaces the weak ringing current from the originating office with fresh ringing current from the office in which it is located.

In this circuit, when the ringing power is discontinued from the originating office, the AC relay releases, in turn releasing the other two, which restores the amplifier to the circuit and makes it ready to transmit voice again.

DC Signals

Fig. 1.4 shows a simplified method of repeating or relaying dc signals around an amplifier. Such a circuit might be used on a subscriber line or automatic circuit where dc dialing or switch-hook supervision was required. Here, the input transformer of the amplifier would present a loop across the input line which would be carrying dc battery and ground from the switchboard. However, the open contacts of relay L prevent this loop from causing a permanent signal. If a subscriber or another switchboard puts a loop across the output line, however, the battery and ground on relay L will cause this relay to operate. This, in turn, would cause the loop through the input transformer to be closed. The result would be that the signal would be transmitted back to the switchboard on the input side. Relay L could repeat both switch-hook or seizure supervision as well as dial pulses.

This, it will be seen, is merely a telegraph repeater as shown in *Fig. 1.1*, combined with an amplifier *(Fig. 1.2)*, to make a repeater which will handle voice and supervision. In actual practice the ringing features of *Fig. 1.3* and the dialing features of *Fig. 1.4* might be found combined on one repeater. Other arrangements are possible also, according to the needs of the circuit to which it is applied.

It should perhaps be pointed out here that a complete repeater would have more equipment than the bare outline shown here. More relays are ordinarily used. For instance, during dialing, it would be desirable to short out the input transformer and provide a "clean" short which would be pulsed back to the dial equipment, rather than interrupt the inductance of the coil. This would be comparable to the way the dial contacts short out the transmitter in a subscriber's instrument.

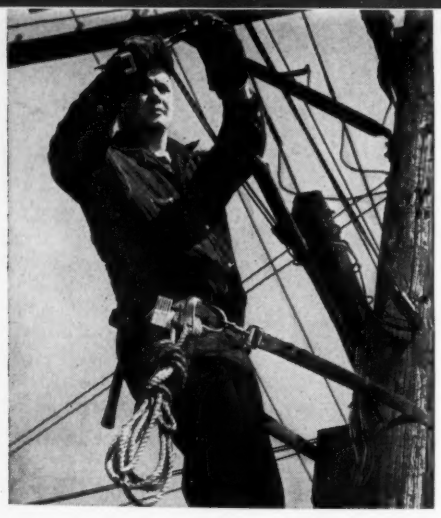
Both Directions

Notice also that all of this chapter has been devoted to transmission in one direction only. However, except for broadcast or other special customer's circuits, telephone lines must handle speech in both directions. Where a repeater is used, it must be a two-way device. This is accomplished by using two amplifiers, one pointing in each direction. If four-wire transmission is being used, as in the case of carrier circuits, and some of the equipment used in nation-wide dialing, two-way transmission is a simple problem, each pair of wires connects to an amplifier which points in the right direction.

Where two-wire systems are used, and this is the case on most circuits, a new problem is encountered. It is the same problem that occurs at every telephone instrument which must resolve the two wires from the transmitter and the two wires from the receiver, a total of four wires, into a two-wire line back to the office.

The telephone does this with the induction coil. Part of the function of the coil is to reduce "sidetone," which is the effect of sounds going into the transmitter and coming out of the receiver of the same instrument. This same effect can occur in repeatered circuits, but may be known by such names as "feed-back," "oscillations" or "singing." While excessive sidetone at an instrument can be merely annoying, the same effect in a repeater can prevent conversation from going ahead because the amplifier aggravates the condition.

How this problem is met is discussed in the next chapter of this series, which deals with two-way amplification and "hybrid coils."



THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITOR

SINCE Southern Bell Telephone & Telegraph Co.'s suggestion system was inaugurated back in 1944, over 3,000 suggestions have been accepted by the company and awards totaling $64,850 have been given employes submitting these acceptable suggestions.

In addition to the initial acceptance award given each accepted suggestion, special merit prizes have been awarded suggestions of outstanding value to the company. Included in their merit awards were two $1,000 grand prizes, 11 $500 grand prizes, 102 $100 division prizes and 312 $50 departmental prizes.

The purpose of the suggestion plan is to encourage employes to think constructively and to submit ideas to improve telephone service.

•

Various health studies made in industry indicate that three-fourths of all sickness strikes at one-third of the population. A study that claims to shed the greatest light on sickness patterns among human beings is reported as nearing completion for the New York Telephone Co.

In progress now for four years, this study covers the sickness records of 1,297 women and 1,527 men. At the time of employment all of these people were given medical examinations and found to be in good health and free of organic disease. Yet in the first year of employment the sickly third of the men employed accounted for 91 per cent of the total days lost due to sickness. At the other extreme, the "well" third had no absences whatever. Much the same picture obtained with women. The sickly third had 85 per cent of all disability.

•

A letter sent us from J. H. Collyer, of Chile, South America, makes mention of the pre-plastic era when a type of wire was recognized by its outer braid covering and color. Now, he states, that wire must be ordered and used with more care in order to make certain the proper type is selected for each particular purpose. This is due to the present plastic insulation of most wire being similar in appearance.

Despite all this, we are certain that no one would be in favor of reverting to the older types of wire as the new types have a much longer trouble-free service life.

•

There is every indication that, at some future time, the conductors of exchange cable will all be plastic-insulated. The increased cost of this insulation over paper unquestionably can be justified in reduced maintenance costs.

Service interruptions resulting from moisture entering the sheath of paper-insulated cable are not only costly but are also detrimental to public relations.

•

Reliable world-wide telephone service is certainly a necessity in this busy modern world of ours.

When the new submarine telephone cables are completed to Europe and Alaska, we will have a good start toward realizing this requirement. The next step will undoubtedly be the installation of a submarine telephone cable across the Pacific. Such a cable would certainly serve a useful purpose and we predict that it will be undertaken in the not-too-distant future.

•

The writer has always been of the opinion that a fire-police emergency telephone system gives the best possible protection for any community. This applies to the large city as well as the small town or village.

The success of a system of this type recently installed in Miami, Fla., appears to have convinced other communities of its numerous advantages.

We now hear that Indianapolis, Ind., has contracted for such a system with the Indiana Bell Telephone Co. Similar systems are in the planning stage for Omaho, Neb., and Sioux Falls, S. D. A total of 12 cities either now have or are planning the installation of emergency fire-police telephone systems.

We believe that many Independent companies should investigate the installation of similar systems in towns in their territory. This not only would mean additional revenues for the operating telephone companies but it would also prove an economy to the various municipalities.

•

A water pipe does not always provide a good ground connection in some of the new housing developments. This can often be traced to a rubber insert placed in the pipe to reduce noise.

Perhaps the best grounding method to be used under all conditions is the sectional rod that may be conveniently driven to the required depth to provide the necessary low resistance.

•

The Commanding Officer of the Signal Corps Plant Engineering Agency, Col. A. O. McLane, has retired from the army after having completed more than 32 years of active service. Colonel McLane has accepted a position with the Gustav Hirsch Organization in Alaska.

Lt. Col. M. E. Brown is now Commanding Officer of the Agency.

•

According to the *New Yorker* magazine, a lady doctor setting herself up in practice received the following report from her telephone answering service on the first morning of her new life: "You had a call at 9:13 a.m., but it was a wrong number."

•

It has been said that modesty is the art of encouraging people to find out for themselves how important you are.

star salesman or selling dunce?

By BERNARD P. GALLAGHER

The author rates six advertising salesmen's performance. General checking points could apply to telephone employees who participate in service merchandising programs.

EFFECTIVE personal selling is at a premium today. Top management and sales and advertising executives know it. But there is some evidence that they aren't doing all they can to get the most out of their own salesmen.

Too many salesmen are not selling. The fault may be improper training. Or it may be that some men are miscast in the role of salesman. Whatever the reasons for salesmen's shortcomings today, it's up to the sales manager and his superiors to ferret out the trouble.

Have you taken a good look at your salesmen lately? Are you convinced they're as good as they could be? Are your men bringing in orders or coming back with lame excuses? When did you last check carefully to see if your salesmen know even the rudiments of good selling?

Even the best salesman gets rusty. Unless there is continuous training for the experienced hand as well as the neophyte, sales management is apt to fall flat on its quotas. Sales managers recognize three major parts to any complete sales training program:

(1) how to be a salesman
(2) how to be a salesman of product X
(3) how to be a salesman of product X in competition with other products.

But are sales managers doing anything with this basic information? Are they offering even adequate sales-training programs? Do they know how or if their men follow through on the firing line?

I raise these questions advisedly. Recently I had occasion to hear and analyze the selling presentations of six media salesmen. What I learned and observed from this experience leads me to wonder about the efficiency not only of media salesmen but of all salesmen. Selling techniques are basic whether they apply to advertising or to nuts and bolts.

The first man made such an inept presentation and violated so many basic rules of salesmanship that I began to wonder about the other five. I decided to write up a critique on each man. This was dictated to my secretary immediately after the salesmen left my office. From each critique I made an individual performance rating chart which I used to compile a master chart.

Results were discouraging. There was an appalling lack of good basic selling practices. Out of six experienced salesmen (experience ranged from two to 20 years) only one took the time and trouble to learn something about my business and to prepare any material before making the call.

It is almost impossible to sell anything without first determining a prospect's needs. Yet only two came prepared on this score. Nor was there much attempt to determine those needs once the interviews began. One salesman made a fair attempt by asking a few preliminary questions about the reasons for wanting to advertise in his publication. Three asked no such questions at all. Instead they began at once to go through their presentations. It was somewhat like a marksman who fires without first looking at his target.

Two presentations were tailored to meet the prospect's needs (these were the same two who determined such needs). However, only one presentation was effective enough to make a sale. Generally, the presentations were too complicated and irrelevant.

The sales kits and physical selling equipment were generally above average. But the meat of the salesman's presentation — the selling material — was for the most part dated. It's difficult for a prospect to believe a set of facts and figures two or three years old. Yet three of the salesmen came up with outmoded data—but with great expectations of clinching the sale.

On competition all were ethical and fair. There was a minimum of viciousness. However, two didn't have sufficient information on the competition to sell effectively against it. Two were well informed competitively, the other two had barely enough knowledge about their competitors to get by.

The men all rated well on personal appearance. On the personality side I would score four above average, one as too mild and another as too surly.

The major weakness of all was their lack of basic salesmanship. They had either forgotten or neglected the simple rules that every good salesman constantly re-learns and puts to use. On this, I scored only one of the salesmen *above average*, one as *average* and the other four would have to go down in my book as *selling dunces* when it came to knowing the primary rules of how to sell effectively. While their knowledge of their product was above average or at least average and only two were below par in knowledge of their competition, only one, in my opinion, could pass a basic salesmanship test with anywhere near a decent grade.

In totting up the results of my critique on each salesman, I found that only one was above average, two average and three failures. Not an encouraging situation.

It's true, of course, that an analysis of only six salesmen does not constitute a comprehensive study of all salesmen's weaknesses and foibles. But it is, I think, a valid test case, especially when you consider that they represented good companies with astute and alert managements.

Somewhere along the line, it seems to me, the salesman is being neglected. He is inadequately supervised or improperly trained or downright inefficient on his own hook. This suggests generally the need for study and reappraisal of all salesmen and sales-training methods. It suggests, too, that the rules of basic salesmanship should be as familiar to the salesman as his own hat.

Salesmen like the ones who called on me must be reminded that selling is service. Selling is a full-time job. It's doing something for somebody else. It is neither asking nor promising favors in return for business. It's showing a prospect how he can be happier or make more money or be more successful by using whatever it is the salesman has to sell. Selling is interpreting a product in terms of a prospect's needs.

A man becomes a good salesman when he has pride in himself and in his product. He respects knowledge and knows he must have plenty of information about his prospect and his

own product. There are certain rules he knows he must follow if he's to succeed. Sometimes a good salesman knows these rules instinctively. Generally he must learn and re-learn them if he's to continue bringing in the order. Good salesmen are made by checking off rules like these:

In action:

✔ Learn all you can about your prospect, your product and your competitors.

✔ Before making a call learn as much as possible about your prospect's needs and who has the authority to make the decision.

✔ Check your brochure to be certain that all material is neat and up to date.

✔ When you make your presentation, be certain that it is tailored to fill the needs of your prospect, that it is simple, concise and easily understandable.

✔ Don't get too close to your prospect when making your presentation. Move alongside him only if he invites you to do so, otherwise make your presentation facing him.

✔ Feel out your prospect at the beginning of the presentation to determine his needs and his authority. At least half of any good presentation is spent in asking questions.

✔ When you make a positive statement, prove it with visual proof from your presentation and obtain acceptance by asking your prospect whether or not he agrees with you.

✔ If you are forced to make an incredible statement, preface it with a remark such as: "This fact may be very difficult to believe, Mr. Prospect, but here is the proof."

✔ Be certain that your prospect understands and accepts your presentation step by step. Do not continue unless each point is accepted.

✔ When your prospect advances his arguments, restate them clearly in your own words so that he realizes you understand them, then proceed to answer them.

✔ If your presentation has been accepted step by step, the close is a natural one. The only decision to be made is *when*, and of course, the time is *now*, so that your close should consist mainly of reasons for acting *now*.

In person:

✔ Make sure all your equipment, including your sales kit and brief case, is crisp and fresh looking, that your personal appearance mirrors success. People like to do business with successful people.

✔ Wear good clothes, have your hair cut regularly, have your shoes shined, be well groomed at all times. Pay particular attention to your finger nails. Try to check your appearance before each presentation.

✔ Beware of body odors and bad breath, especially when you are making a call immediately after lunch. Do not call on a prospect with alcohol on your breath. Your prospect may be a teetotaler and resent it.

✔ Keep a smile on your face whenever possible. Check to be certain that your facial characteristics are in tune with your arguments. Remember that a salesman is an actor. If you look sad, you will create the same feeling in the prospect. The most contagious thing is a smile.

✔ Speak simply, directly and honestly. Don't exaggerate. If you do not have the information, don't try to bluff your way, just tell the prospect that you don't know, but that you will try to get the information for him. Never be evasive.

✔ Avoid discussing politics or religion or any topic not directly concerned with your sale. Stick to the point and only discuss personal matters when the prospect leads the way.

✔ Speak at a moderate rate and in a pleasant tone, don't talk too fast or too loud.

"He worked out side as a lineman
so long he misses the weather."

✔ Be certain that your attitude is positive at all times.

In general:

✔ Don't do all the talking yourself.

✔ Never interrupt your prospect.

✔ Avoid an argumentative, know-it-all attitude.

✔ Select one key issue, and stay with it. Don't allow your prospect to digress.

✔ Don't speak negatively of competition. Handle competition by presenting the strong points of your product rather than the weak points of competition.

✔ Analyze your failures so you can learn to avoid them and analyze your successes so that you can take advantage of them.

✔ Don't shift your eyes from side to side. Look directly at the prospect. This gives the impression of straightforwardness and gives you the opportunity to discern reactions to your statements.

If the six salesmen had been thoroughly briefed in these basic selling rules of how to be a good salesman, I know for sure there would have been fewer selling dunces in the lot.

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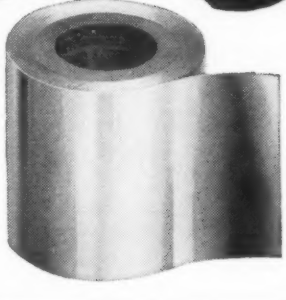

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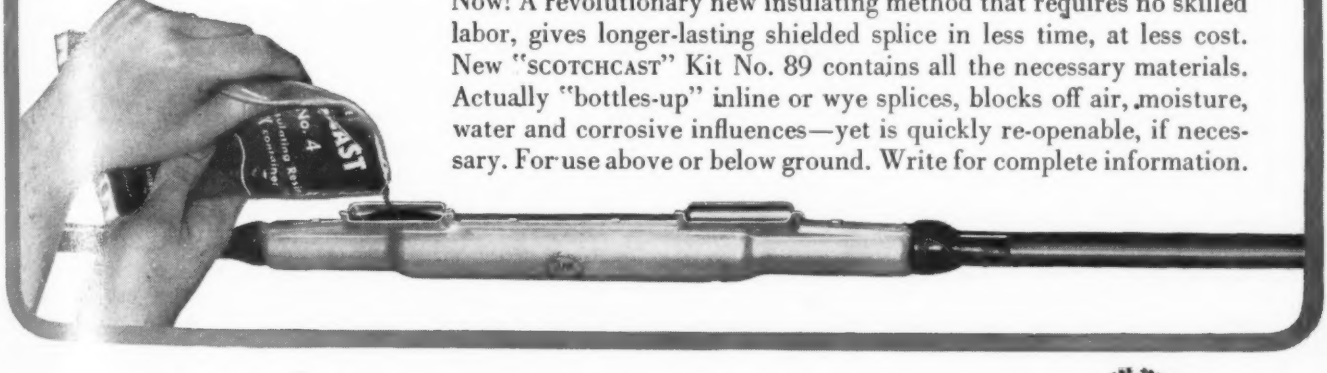

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3M COMPANY

Courts and Commissions

Indiana Company Sues To Continue Serving

The Indiana Telephone Corp., Seymour, has filed suit against the Indiana Public Service Commission and Warren Buchanan, M. Elliott Belshan and Wendell Tennis, as members of and constituting the commission. The case was filed in the Martin County Circuit Court on June 18.

Attorneys for the plaintiff are Goodrich, Campbell & Warren. The attorney for the defendant is Carter W. Eltzroth Jr.

The suit concerns the action of the commission, an administrative body, to prohibit the Indiana Telephone Corp. serving the territory on which the National Gypsum Co. and U. S. Gypsum Co. are located.

The commission has ordered Indiana Telephone Corp. to discontinue service at such time as the Daviess Martin County Rural Telephone Co. is able to start service.

It is expected that the suit will come up in the October session of the court.

Ark. Commission Criticized For Territory Allocation

The Arkansas Public Service Commission was criticized on Aug. 17 for its allocation of territory in southwest Arkansas to a telephone cooperative.

The attack came in a suit filed in Pulaski Circuit Court by the city of Emerson, the Union Telephone Co., Smackover, and the Walnut Hill Telephone Co., Lewisville (TELEPHONY, July 2, p. 32).

The companies asked Circuit Judge J. Mitchell Cockrill to direct the commission to "follow the law and evidence" in dividing telephone service areas between the private companies and the Southwest Arkansas Telephone Cooperative.

The city of Emerson said the commission ignored the wishes of the people in July when it gave authority to the co-op to buy the Emerson exchange and serve Columbus and Ozan as well as the rural areas.

The city said it had granted a franchise to Union to serve the city and the suit said the co-op had no such franchise. Union Telephone contended that the commission ignored this franchise agreement, as well as evidence in refusing the company the right to buy the Emerson property.

J. D. Garrett Jr., doing business as the Walnut Hill Telephone Co., argued that the commission had unfairly limited the area his company could serve. At the hearing before the commission, the Walnut Hill company had been criticized for extending service into an unallocated area without approval.

Walnut Hill was authorized to serve Saratoga, Okay and Ben Lomond. Then the commission decided it would be in the public interest to permit Walnut Hill to stay in the area it had moved into without approval.

Walnut Hill had asked to serve a much wider area but the territory was given to the co-op.

United Utilities Sells $4,000,000 in Debentures

United Utilities, Inc., Kansas City, Mo., has sold 4 million dollars of 4 per cent, 25-year debentures to institutional investors. It will use 1.6 million dollars to discharge short-term debts, 1.8 million dollars will be advanced to subsidiaries for construction and the $600,000 balance will be added to working capital.

The company has purchased one million dollars of common stock of its subsidiary, United Telephone Co. of Pennsylvania.

Indiana Bell Asks to Take Over Exchange

The Indiana Public Service Commission was asked on Aug. 18 to approve Indiana Bell's proposal to take over the Summitville exchange and provide extended service between it and the Alexandria exchange.

The Summitville exchange is now operated by the Union Telephone Co. Indianapolis-Indiana Bell holds the majority interest in the Union company. It will be modernized and expanded if the proposal is approved, the commission was told.

A present 10-cent toll charge between the two exchanges will be eliminated under the company's proposal.

Nevada Independent Asks Increase in Rates

The Nevada Public Service Commission on Aug. 16 took under study a request by the Southern Nevada Telephone Co. for rate increases up to 40 per cent in the Las Vegas area.

The company asked that the new rates go into effect Aug. 21, the date of a cut-over to dial service.

The proposed new rates in Las Vegas and North Las Vegas with the old rates in parentheses are:

One-party—residence, $6.00 ($4.10); business, $11.25 ($7.00).

Two-party—residence, $4.65 ($3.50); business, $8.50 ($6.00).

Four-party—residence, $4.25 ($3.00); business, $6.50 ($4.85).

The proposed new rates in Boulder City:

One-party—residence, $5.00 ($3.75); business, $8.00 ($5.75).

Two-party—residence, $4.00 ($3.10); business, $6.00 ($4.75).

Four-party — no residence service; business, $3.40 ($2.50).

C&P of W. Va. Takes Option To Buy Independent

An option to purchase the property of the Inland Telephone & Telegraph Co., Middlebourne, W. Va., has been taken by the Chesapeake & Potomac Telephone Co. of West Virginia, it was reported on Aug. 11.

About 500 subscribers are served by the Inland company from a magneto switchboard in Middlebourne.

Authorizes Oregon Loan

Oregon Public Utilities Commissioner Charles H. Heltzel on Aug. 29 authorized the Redwoods Telephone Co., Cave Junction, to borrow $6,000 from the Bank of Illinois Valley, Cave Junction, for five years at 6 per cent.

FACTS ABOUT Exide®

MANCHEX® TELEPHONE BATTERIES

MICROWAVE DEPENDABILITY ...ASSURED BY DEPENDABLE EXIDES!

ENSURING CONTINUITY OF SERVICE, GUARANTEEING OPERATION OF EQUIPMENT INSIDE MICROWAVE RELAY TOWERS ARE THOUSANDS OF EXIDE BATTERIES. THEY FURNISH INSTANT, AMPLE POWER FOR MANY EMERGENCY NEEDS—DO IT WITH LOW OPERATING, DEPRECIATION AND MAINTENANCE COSTS. EXIDES ARE ALWAYS YOUR BEST BATTERY BUY—*FOR ALL TELEPHONE SERVICES!*

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A USER OF EXIDES—ALWAYS DEPENDABLE BATTERIES—SAID THAT RECENTLY. THE "POWER ROOM" OF THIS INDEPENDENT TELEPHONE COMPANY ENGINEER IS PLANNED TO ASSURE SERVICE CONTINUITY UNDER PRESENT LOAD CONDITIONS AND DURING FUTURE GROWTH. EXIDE MAKES A COMPLETE LINE OF TELEPHONE BATTERIES—IN BOTH GLASS AND PLASTIC...BACKS THEM ALL WITH YEARS OF CONSTRUCTION SKILL AND ENGINEERING RESEARCH.

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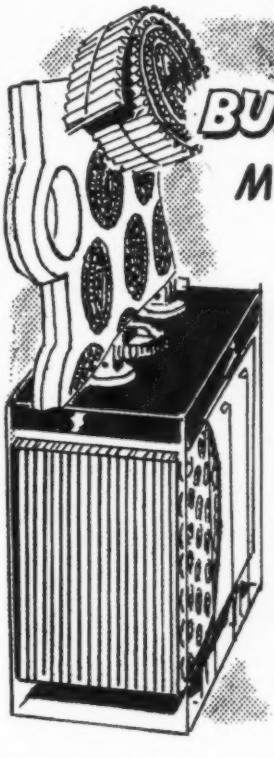


BUTTONS OF LEAD MEAN LESS COST FOR YOU

THE IMPROVED PLANTÉ TYPE POSITIVE PLATES OF THE EXIDE-MANCHEX BATTERY ARE OF THE MANCHESTER DESIGN—AN EXCLUSIVE EXIDE FEATURE. BUTTONS OF LEAD DELIVER THE POWER YOU NEED, WHEN YOU NEED IT. OVER A HALF CENTURY OF DEPENDABLE PERFORMANCE IN TELEPHONE BATTERY SERVICE HAS DEMONSTRATED THAT EXIDE BATTERIES WITH THEIR BUTTONS OF POWER ARE YOUR BEST POWER BUY—*AT ANY PRICE!*

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

Authorize Rate Increases For Nebraska Independent

The Nebraska Railway Commission has authorized an increase of rates for the Lodgepole Telephone Company. Former rates and the new rates (net) effective Sept. 1, are as follows:

	Old	*New*
One-party business	$5.50	$6.00
Two-party business	4.75	5.25
One-party residence	3.50	4.00
Two-party residence	3.00	3.50
Four-party residence	2.50	3.00
Rural	2.50	3.00
Switching services	1.25	1.50

Under the new rates, total annual operating revenue is estimated to be $12,956; expenses, $9,987, exclusive of taxes estimated to be $669. This will result in a rate of return of 6.28 per cent upon a net book rate base of $34,-833 plus an allowance for cash working capital, materials and supplies. The over-all rate base is $36,621.

The company anticipates an increase in expense due to the establishment of a salary for a bookkeeper and an increase in the manager's salary. Increases in other general expenses are estimated at $100 per year.

Lodgepole converted its exchange to dial service two years ago and now serves 298 customers, 142 of which are service station subscribers.

Pennsylvania Company Offers 20,663 Shares of Common

An offering of 20,663 shares ($299,-613) of Commonwealth Telephone Co., Dallas, Pa., common stock is on the market. Eastman, Dillon & Co. has priced the shares at $14.50.

The company will use proceeds, together with one million dollars of first mortgage bond money and proceeds from the sale of 7,000 shares of preferred stock, to reduce outstanding bank debts.

Ind. Company Names Schafer Secretary-Auditor

Clifford E. Schafer, secretary and auditor, Citizens Independent Telephone Co., Terre Haute, Ind., recently resigned his position to accept a similar position with The Home Telephone & Telegraph Co., Fort Wayne, Ind. Mr. Schafer had been associated with the Citizens Independent company for the past 31 years. Members of the accounting department presented Mr. Schafer with a piece of luggage prior to his departure.

Robert Mutch, a native of Jacksonville, Ill., succeeded Mr. Schafer as secretary of the company. Mr. Mutch went to the Citizens Independent company from the Blue Mountain Telephone & Telegraph Co., Bangor, Pa., where he served as assistant secretary and auditor.

Shown at the dinner party honoring C. E. Schafer, secretary-auditor of the Citizens Independent Telephone Co., Terre Haute, Ind., who resigned to accept a similar position with the Home Telephone & Telegraph Co., Fort Wayne, Ind., are (standing left to right): J. P. Berry, John C. McAtee, Paul F. Stearley, Ronald Luther, Charles Dressler, Eric Backus and Robert Mutch. Seated are: S. B. Dibble, C. E. McCormick, Mr. Schafer, O. B. Gordon, and Walter C. Eisenhut.

Mr. Schafer was invited back to Terre Haute to attend a dinner party at the Hotel Deming, arranged by his associates in his honor. He was presented with an engraved, gold wrist watch as an expression of their regard for him.

Minn. Association Begins Public Relations Program

Start of a year-round program to familiarize the public with the size and scope of Minnesota's telephone industry was announced recently by the Minnesota Telephone Association, Inc., sponsor of the public education program. The association represents over 210 operating telephone companies, including Northwestern Bell Telephone Co., within the state.

C. F. Marvin, manager of the Zumbrota (Minn.) Telephone Co., is chairman of the committee named by the association's board of directors to supervise the program. Other committee members include George F. Rohe, manager of Minnesota Community Telephone Co., Waterville; P. M. Ferguson Jr., manager of Mankato Citizens Telephone Co.; Wayne Caldwell, manager of Home Telephone Co., Clarkfield; A. H. Brown, commercial manager of Pioneer Telephone System, Waconia; and Keith W. Vogt of St. Paul, executive secretary of the Minnesota association.

Mr. Marvin said the program's purpose will be to familiarize the public "with the growing importance of the state's telephone network in our expanding business and agricultural economy." At the same time, he added, the program "will spell out some of the tax and financial problems which confront the industry as telephone companies seek to keep pace with the increasing demands for additional and improved service."

John Withy & Associates, St. Paul advertising and public relations firm, has been retained to assist with handling of the program, Mr. Marvin said. Some of the activities will include formation of a speakers bureau, production of direct mail and other literature, and start of an industry public information service.

Another feature of the program, Mr. Marvin said, is the bimonthly publication of an association paper, *The Gopher Circuit*, which will supplement Mr. Vogt's regular bulletins, and will carry news about the program, tips on good advertising and public relations procedures, reports from local companies on their own programs, and general association activity news.

Obituary

PETE GRINA, who has been employed by various telephone companies in North Dakota and Missouri for the past 50 years, died on Aug. 17 in Fargo, N. D. He entered the hospital in May suffering from leukemia.

He is survived by three brothers, Victor, Melvin and Linton and three sisters, Hilda of Northwood, N. D., (Mr. Grina's birthplace), Mrs. Waldo Rossett and Mrs. H. Wenaas.

ACME VISIBLE

UNDER-GLASS BULLETIN HOLDER

For Quick Reference To:

1. Emergency phone numbers such as Fire Dept., Police Dept., Ambulance and Hospital numbers.
2. Hotels with C-L-R service.
3. Western Union phone numbers.
4. Telephone numbers of local companies receiving frequent long distance calls.
5. Frequently called direct circuit points and tributaries.
6. DSA Toll points.

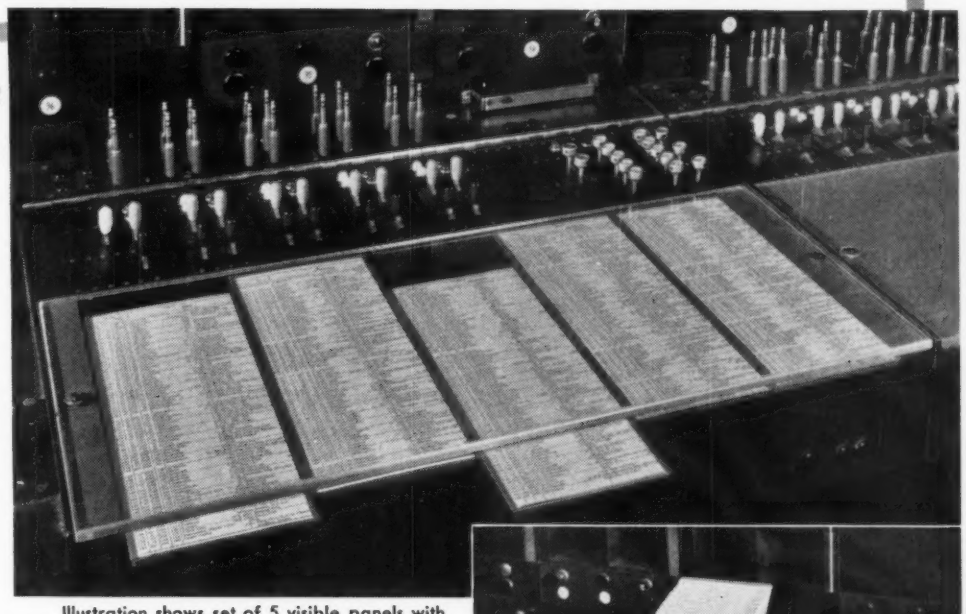
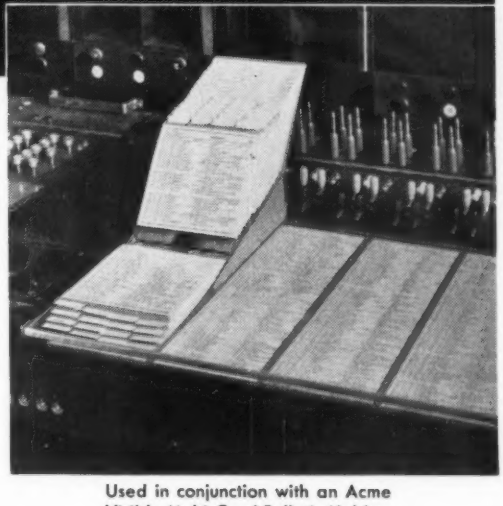


Illustration shows set of 5 visible panels with shim at each end—over-all width 21 31/32".



Used in conjunction with an Acme Visible Multi-Card Bulletin Holder.

These Acme Visible units fit under the Bulletin Glass and make corrections and changes easier because the bulletin can be removed without loosening the glass. The bulletin is divided into a number of panels and only the panel (page) to be corrected need be removed.

The panels are of one piece steel construction, flanged at the back and side edges to hold the bulletin in place, and the front edge is formed downward to provide a "pull" to use in sliding the panel out.

A shim is used adjacent to each end panel to make the over-all width the same as the Bulletin Glass space. The shims are slightly thicker than the panels and have a slot through which the Plexiglass screws are tightened. This holds the glass firmly, yet provides for sliding the individual panels in or out.

Units supplied to meet dimensional requirements both as to individual panels and over-all sizes, depending upon type of board in use.

Acme Visible Equipment has been designed for telephone use by Acme Systems Engineers in close cooperation with practical, experienced telephone experts. Tell us your requirements and receive our suggestions and quotations.

Here are two illustrated booklets describing various units which have been designed for, and use-tested by, telephone companies throughout the country.

Send for your copies TODAY!

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ACME VISIBLE RECORDS, INC., Telephone System Division, Crozet, Virginia

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☐ #994 on Acme Multi-Card Bulletin Holders ☐ #982 on Acme Flexoline for Telephone Companies

☐ Have representative call. Date..... Time.....

☐ We are interested in Acme Visible equipment for ..... records.
KIND OF RECORD

Company..... Attention.....

Address.....

City ..... Zone..... State.....

Treatment of Standing Poles

*By G. F. EVERT**

Moisture meter readings insure that the poles will be sufficiently dry to obtain good retention of the 6 per cent pentachlorophenol in oil diluent treating solution.

BY WAY of introduction our company is an Independent company operating in several counties in Northwestern Pennsylvania, an area comprised of hills and valleys. About one-half of our rights-of-way are located in open area and about half through timber lands.

For several years we have been gravely concerned about the condition of the cedar poles in our plant. The concern has been caused by fungus or moss forming on the tops of practically all old poles in forested areas, dry rot in open areas, bad splits in the outer shell of sap wood and insects.

In 1953, we learned, through power and telephone trade journals, that overall treatment to standing poles had been made. In 1954, we gained more knowledge of the results obtained by the experience of other companies.

In April of this year, a contract was made with Pole Sprayers, Inc., of Buffalo, N. Y., for the treating of poles in two short-haul toll lines. These lines consisted of 1,068 poles varying in sizes from 25 feet to 40 feet in length at a cost of approximately $7.00 per pole. The in-plant service of the poles is: 64 per cent, over 20 years; 4 per cent, over 15 years; 10 per cent, over 10 years; 20 per cent, over five years; 2 per cent, less than five years.

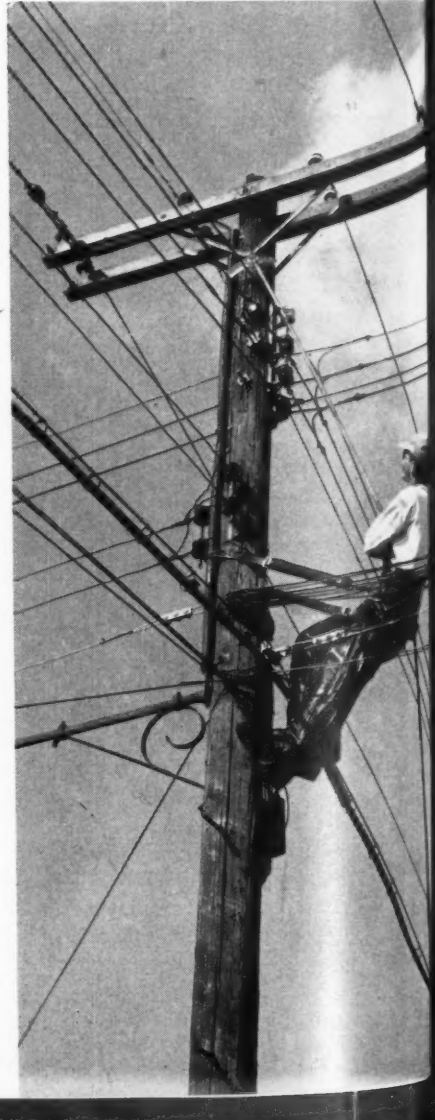
The contract with Pole Sprayers, Inc., provided that the preservative material would be 6 per cent pentachlorophenol in petroleum oil diluent and that sufficient quantities of solution would be applied to obtain 25 per cent of solution per cubic foot of sap wood. It also provided that the contractor should cover all and any liabilities and property damage by insurance certificate and other matters in regard to workmen's compensation, etc.

This contract was taken on a minimum 500-pole basis. The work has been completed and all reports have been received by our company. The average moisture content, when treating, was 13 per cent. The average retention was 36 per cent, which for all purposes is a very good report. Treatment was not applied to any poles that did not have an estimated 10-year remaining life. Therefore, we expect about 20 more years service from the oldest poles. In a 10-year period, it is estimated that we would have to spend approximately $22,700 for the replacement of 700 of these poles. Interest on values mentioned has not been considered in any case.

Our curiosity, as to the methods of operation of the crews, induced us to observe the procedure. The preparation consisted of thorough inspection of each pole and the loosening of the

(Please turn to page 39)

Long fiberglass extension tubes on joint work involving electric wires.



*Mr. Evert is vice president of the Home Telephone Co. of Ridgway, Pa.

After initial adjustments are made, as in photograph, "Mr. Meticulous" automatically performs critical operations in making junction tetrode transistors—tiny experimental devices which may find important uses in the telephone system.

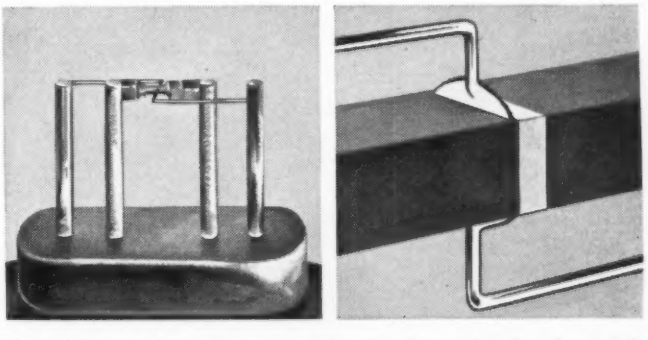
The machine we call "Mr. Meticulous"

Bell Laboratories scientists, who invented the junction transistor, have now created an automatic device which performs the intricate operations required for the laboratory production of experimental model transistors.

It takes a bar of germanium little thicker than a hair and tests its electrical characteristics. Then, in steps of 1/20,000 of an inch, it automatically moves a fine wire along the bar in search of an invisible layer of positive germanium to which the wire must be connected. This layer may be as thin as 1/10,000 of an inch!

When the machine finds the layer, it orders a surge of current which bonds the wire to the bar. Then it welds the wire's other end to a binding post. Afterward, it flips the bar over and does the same job with another wire on the opposite side!

Once only the most skilled technicians could do this work, and even their practiced hands became fatigued. This development demonstrates again how Bell Telephone Laboratories scientists work in every area of telephony to make service better.



Transistor made by new machine is shown in sketch at left above, magnified 6 times. At right is sketch of area where wires are bonded. The wires are 2/1000 inch in diameter, with ends crimped to reduce thickness.

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construction and maintenance DIGEST

- "Freeze" frequencies
- Lightweight champ
- Happy Anniversary
- Have we got wire
- Die-hard battery

Published every week to help you get the most out of your materials and supplies dollar

by C. J. Reynolds, Stromberg-Carlson Company

The few dollars you spend on *reliable* equipment today will be repaid a hundredfold in lower maintenance costs for years to come. Protect your investment with the double guarantee offered by Stromberg-Carlson. First, leading manufacturers build this equipment, and guarantee it. Second, because we recommend and sell this equipment to the telephone industry, we *also* guarantee its performance!

Converter for harmonic ringing stops frequencies from creeping

Cross-ring in a harmonic ringing system can only be prevented when you find some way to nail down each of the five frequencies—16-2/3, 25, 33-1/3, 50 and 66-2/3 cycles.

If you have looked into this problem, you'll be pleased to know that there is a machine that actually does just that – pins down each frequency and **locks** it by a definite ratio to the 60-cycle input frequency.

This machine is the Lorain H-5 Sub-Cycle. It uses a special principle of operation, making it **impossible** for your ringing frequencies to creep out of line.

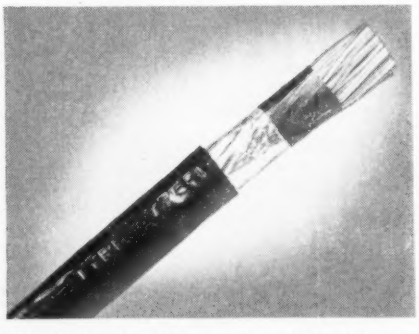
Add to this the fact that the H-5 Sub-Cycle provides exceptional voltage regulation—preventing ringing troubles—and you have a very useful machine indeed.

Lorain H-5 Sub-Cycle.

It's economical to operate, too—the H-5 Sub-Cycle has no moving parts, no expendable components. You just install it and forget it. And it requires only 1400 watts power at full load—slightly more than the full load requirement of a 1 H.P. induction motor.

Here's easy-handling cable—Aerial, burial or tucked in a duct

You can cut installation and handling costs, save yourself a lot of time, with Ankoseal lightweight plastic cable.



Polyethylene insulation and special jacket compound of this cable give plenty of protection.

It has polyethylene insulation that gives you excellent moisture resistance and thereby eliminates the hazard of wet cable. Another advantage of polyethylene is its high dielectric strength, which means less lightning trouble.

And to give you an unbeatable protection from weather, the Ankoseal 454 jacket compound is used. This special formula not only shrugs off climatic conditions but als resists corrosion, electrolysis and v bration cracking.

Ankoseal lightweight plast cable is made for aerial (both me senger and self-supported), for du and for direct burial installation

The Silver Anniversary Terminal

Time Tested, Time Proved. Ye the past 25 years of experience ha proved the Cook XB Cable Term nal is the best of its kind.

Unprotected XB Cable Terminals, available in 11-, 16-, and 26-pair sizes, with or without stu

The features are: A patente Bakelite faceplate and fanning strip moulded in one piece; non-corro ing everdur studs that cannot twi or turn; sturdy, reversible zinc hoo for taking stub out top or botto patented weather guards at th drop wire opening, all combine t make this unit the outstanding u protected terminal on the marke

11 answers to wire problems

Corrosive atmosphere—weather extra strength—pliability. These a the special problems and needs yo run into in wire maintenance. Ther

are 11 types of Neale spinning lashing wire, each built to solve on or more of these problems for yo

.061 Type 316 Stainless Steel
.061 Type 430 Stainless Steel
.090 Copper

.091 Copperweld
.080 Copperweld
.091 Aluminum Alloy
.080 Aluminum Alloy
.091 Galvanized
.061 Galvanized
.091 Special Soft 2.5 Bethanized C-Coating Galvanized
.061 Bethanized 1.5 C-Coating Galvanized

Protect yourself from battery failures

You can use Exide Manchex Batteries for central office and private branch exchange equipment, and be sure you'll get a supply of power when you need it. These batteries have been proven daily in exchanges of every size, and for 67 years Exide Batteries have been serving the telephone industry.

The manchester positive plate with its exclusive button-type construction provides exceptionally

Old age, even high discharge rates, have little effect on this battery.

long life. Latest developments on molded glass jars permit compact space-saving installation.

Heavy terminal posts with copper inserts provide extra conductivity for sustained voltage at high discharge rates. Microporous rubber along with slotted plastic separators, are impervious to chemical and electrical reactions. Plastic spacers assure plate alignment.

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ground around the base, testing the pole for moisture content, then if favorable, the spraying procedure begun. This revealed several noticeable facts, namely: (1) The over-all change in the coloring of the poles, (2) insects near or on the pole surface were immediately killed, and (3) all vegetation and insects inhabiting the area around the base of the pole were killed instantly.

We have not, at this writing, removed for sectionalism any poles for detail examination to prove the effectiveness of this treatment. We do not expect to do so because others have done it and their reports have been very satisfactory. The life expectancy of the poles gained from this treatment will more than offset the expense involved over a period of years, and it will defer the pole replacements to a much later date.

Sales Magazine Features 49 Ways to Use Telephone

"Any art, device or skill which can stretch a salesman's selling day will increase his sales and earnings. One skill which can definitely and concretely stretch a selling day is skill in the use of the telephone."

Exactly how to use this result-producer is the subject of a three-part series, "49 Ways To Make The Telephone Work For You," researched and written by Ted Johnson, founder of the Sell-O-Phone Workshop. The first of this detailed, "how to" series appears in the September, 1955, issue of *The American Salesman*, a new publication.

"Studies conducted in many kinds of industry," says Johnson, "have uncovered 49 ways to use the telephone to increase sales, multiply time, and enlarge a salesman's earnings." Included are such sale-making uses as "screening prospects from 'suspects'," making callbacks and closing sales, keeping close to out-of-the-way accounts, quick follow-up of leads and prospects, disposing quickly of odd lots and leftovers, increasing the size of the order by correcting customer oversights, getting more out-of-town business, making a whole sales trip without leaving the office, etc.

The American Salesman is the first magazine of its kind dedicated to salesmanship as a profession. It aims to improve selling techniques and, at the same time, to raise the salesman's pride in his own profession. It aims also, by doing an urgently needed public relations job for the salesman, to increase the public's awareness of his indispensable role.

The American Salesman is being sold only by subscription—individual subscriptions, and multiple subscriptions by companies for their salesmen and sales executives.

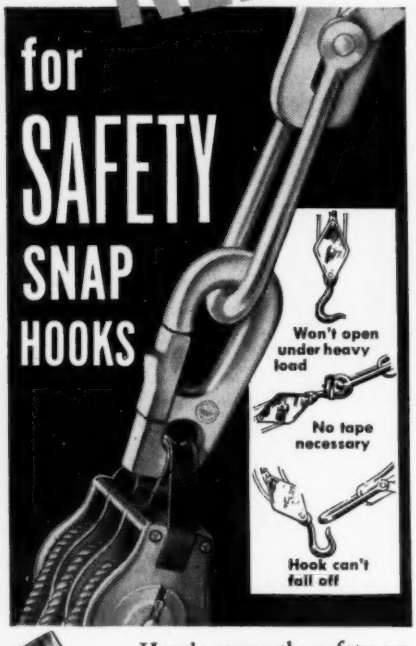
The new magazine is published by The American Salesman, Inc., 49 W. 57th St., New York 19, N. Y. Subscriptions are $5.00 per year.

Mourners, flower girls and "pole-bearers" at the burial of "Old Crank" (an old magneto telephone) which took place during the ceremony marking the recent conversion to automatic of the Mercer, Mo., exchange of the Grand River Mutual Telephone Co. The Mercer exchange is the first of 23 exchanges to be converted by the Grand River company.

Look to the Leader

KLEIN

for SAFETY SNAP HOOKS



455 Solid Eye

Here's strength, safety on heavy loads—for blocks, tackles and hoists. Klein Safety Snap Hooks are time savers, too, eliminating the necessity of taping or wiring the throat. Made of drop forged steel—carry a working load of 8,000 pounds with adequate safety factor. Snap on easily with one hand—may be used on any conventional steel block 6 inches or smaller, or on chain hoists or snatch blocks. Four types regularly available. Specify 455-SH-3 Snap for use with 1½-ton hoists . . . No. 455-SP for double chain hoists and for attachment at housing. Klein can also supply safety snap hooks for lighter loads.

455-S Swivel Eye

455-SH Swivel Eye

Foreign Distributor: International Standard Electric Corp., New York

455-SP

Write for your free copy of the Klein Pocket Tool Guide today!

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Allen Davison, Beatrice, Neb., mayor, and Merle M. Hale, Lincoln Telephone & Telegraph Co. vice president, turn the first shovelfuls of dirt at the ground-breaking ceremony for LT&T's new building at Beatrice. Due for completion on Apr. 1, 1956, the building will house local and long distance dial equipment, district and area offices. Observing are (left to right): Charles Dickenman, area commercial manager; Clyde Burge, district manager; George Miller, general manager of Beatrice Light and Water Dept.; George Barney, general plant superintendent; Lloyd Cleveland, traffic chief; W. W. Eden, building engineer; Paul H. Henson, chief engineer; Dale Rist, president Beatrice chamber of commerce; and K. L. Lawson, general commercial superintendent.

Lincoln T&T to Build Customer Toll Dial Center

Dialing of long distance calls from subscribers' telephones will come to Nebraska early in 1957 at Beatrice when a new automatic system is placed in operation there. This was announced recently by Merle M. Hale, vice president of The Lincoln Telephone & Telegraph Co., at a ground-breaking ceremony for the company's new telephone building at Beatrice (see cut).

Initially, Beatrice subscribers will dial direct to about 250,000 telephones in the state. As the national customer long distance dialing program develops, subscribers there will be able to dial direct from their telephones to several million telephones in the United States and Canada. Later on, customer long distance dialing will also be installed in other company exchanges.

Contracts for the new building were to be let on Aug. 19 with construction to start immediately thereafter, according to Mr. Hale. The building will be completed Apr. 1, 1956, and installation of equipment will then begin at once.

The new two-story brick building will be 82 feet x 112 feet. It will house automatic switching equipment for local telephone service, a new long distance switchboard and operating department, plant maintenance and installation departments together with district and area offices and the business office. A feature will be a drive-in payment window, as well as parking facilities for customers and employes.

England Plans Telephone Expansion at Greater Rate

From the London, England, *Financial Times* comes news that in the 12 months ended May 31, 420,000 new subscribers were added or 30 per cent more than two years earlier, Dr. Charles Hill, the postmaster-general, announced.

Dr. Hill said that this year the post office would spend 81.1 million pounds on capital investment in telephones against 60 million in 1952-53.

The Right Combination

"Creation and imagination must ever go hand in hand. Imagination, coupled with the freedom to use it, is the very basis of what we call free America."—JOSEPH WEIL, *dean, college of engineering, University of Florida.*

THE OPERATOR'S CORNER

Concluded from page 30

credit card call is outside a locally designated area, what information is entered on the ticket?

(5) If the first digit of the credit card number given does not correspond to the last digit of the current year, or the number otherwise appears incorrect, how should the operator proceed?

Answers are presented on page 43.

Michigan Association, Bell Sponsor Centennial Exhibit

The Michigan Independent Telephone Association and the Michigan Bell Telephone Co., in August participated jointly in a telephone industry exhibit at the Michigan State University's Centennial of Farm Mechanization. The telephone exhibit depicted the very latest in telephone communications, such as the operation of a modern dial system, a speaker telephone, an electronic secretary, colored monophones, lighted dial telephones, extension telephones and various types of key telephone sets.

From 9 a.m. until 8 p.m., for six days, approximately 85 people per hour visited the telephone display. There were over 600 exhibits valued at 20 million dollars for the visitors to view at this fair. The people visiting the telephone exhibit voiced amazement and took pride in the progress made in telephone communications.

The communication improvements as shown by the telephone exhibit showed that improvements go hand in hand with general progress as modern equipment replaces older installations and that advances in the field of communications are widening the horizons of today's farm life.

Won't Give Up Party Line; Three Homes Burn

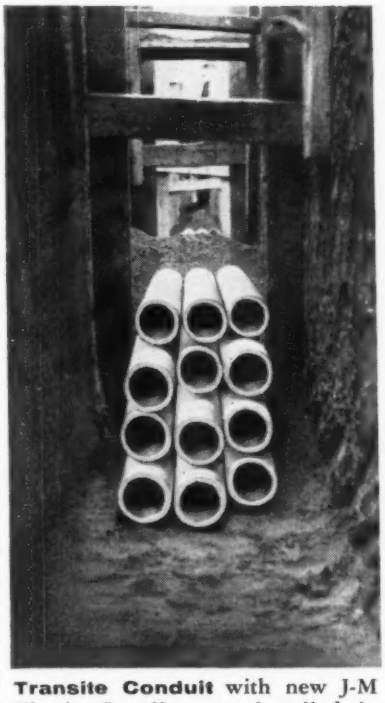
Because a Huntington, W. Va., woman refused to relinquish her party line on Aug. 26, a fire caused $6,900 damage before it was brought under control, the city's fire chief stated.

The chief said that a neighbor tried for five minutes to get the woman off the telephone line, but she refused. Finally the neighbor sent a youngster to the corner to pull the fire alarm box.

One home in Huntington's west end was destroyed, and two others were heavily damaged. The fire chief reported that the blaze left 19 persons homeless, but that there were no injuries.

Long, lightweight lengths of Transite Conduit with new J-M Plastic Coupling ready for far west telephone installation.

...makes **Transite Ducts** cost far less to install



Transite Conduit with new J-M Plastic Coupling are installed in direct contact, saving trenching time and backfilling.

This unique plastic coupling, developed by Johns-Manville especially for telephone service, enables you to install Transite® Conduit at greatly reduced cost. It provides the following advantages:

1. **No separation between ducts**
2. **One backfill instead of several**
3. **Narrower, shallower trench**
4. **Faster installation**
5. **Watertight, silt-tight joints**
6. **No joint sealer**

Furthermore, the tight joints formed by this J-M Plastic Coupling enable you to use pneumatic rodding instead of expensive hand rodding—and eliminate cleaning.

Major telephone companies find that Transite Ducts provide better cable protection at lower cost. Made of asbestos-cement, they can't rust, are immune to electrolysis, resist corrosion and all normal soil stresses. The light 10-foot lengths are easy to install . . . reduce the number of joints in the line.

For more information, call your nearest J-M District Sales Office or write Johns-Manville, Box 60, New York 16, New York. In Canada, Port Credit, Ontario.

JM PRODUCTS

Johns-Manville

TRANSITE DUCTS

MADE OF ASBESTOS

H. E. Clapham, AE Public Relations Director, Dies

Herbert E. Clapham, director of public relations for Automatic Electric Co., died on Sept. 4, after an extended illiness. He was 61 years of age.

Mr. Clapham had been with Automatic Electric for 38 years, having joined the company in 1917 as a laboratory assistant in the technical research department.

After a brief period of military service in World War I, he returned to Chicago to take the company's technical training course, and after several months in installation activities was transferred to equipment engineering. A temporary assignment as a writer of telephone journal articles led to his transfer in 1921 to the advertising department. He was appointed advertising manager in 1924.

In 1945, Mr. Clapham was named director of publicity for Automatic Electric Co. and its manufacturing and distributing affiliates. In this capacity he was responsible for publicity, the company's technical journals and house organs and allied public relations activities. He also served as a consultant on advertising matters.

In 1952, he was presented with the

H. E. CLAPHAM

Talbot G. Martin Award by the Strowger Automatic Club, the Automatic Electric employes organization. The citation read in part: "To Herbert E. Clapham, whose gifted mind and pen, devoted for many years to the promotion of Strowger automatic equipment, have contributed immeasurably to its widespread use."

Mr. Clapham was a frequent contributor of articles to the telephone press and other publications, where he was known for his ability to interpret engineering knowledge in terms the layman could understand. He had been editor of the Automatic Electric Technical Journal since its founding.

He is survived by his wife, a daughter, Mrs. Bernet S. Swanson, and three brothers in England. A son, Herbert, died in 1953.

Telefonos de Mexico Plans $26,400,000 Expansion

To keep pace with growing demands in Mexico for expanded telephone service, Telefonos de Mexico, S.A., the country's major private telephone company, is investing 130 million pesos ($10,400,000) in expansion projects this year.

Jose J. Cesar, Telefonos' subdirector general, admitted that telephone rates have increased 250 per cent since 1939, but said, "that increase cannot be compared to those of costs of equipment, wages, etc., which during those 16 years have gone up 600 per cent." Higher rates for local service mean only a scant 40 per cent more for Telefonos, while those for long distance are only 20 per cent, the official said.

RARE GAS RELAY KILLS INTERFERENCE!

OVER 1/4 MILLION IN USE!

Party Line Transmission and Ringing Improved with Vincent Rare Gas Relay RTC-2

HERE ARE THE FEATURES:

1. Ends all objectionable noise.
2. Prohibits false ringing.
3. Easily installed in all types of equipment.
4. Lightning protection.
5. Non-mechanical, no maintenance.
6. May be used with harmonic or coded bells.
7. May be used on magneto or common battery lines.

$3.62 LIST PRICE

THE THEORY OF OPERATION —

Since the resistance of the relay is infinity below 60 volts, (The relay's normal breakdown voltage) the line remains normally free from paths to ground. Ringing voltages of over 60 volts ionizes the rare inert gases, and therefore is transmitted without difficulty.

FREE: TECHNICAL BULLETIN, WRITE DEPT. 48-A.

Brach

SINCE 1906

BRACH MANUFACTURING CORPORATION
Div. of General Bronze Corp.
200 CENTRAL AVENUE, NEWARK 3, NEW JERSEY
HUmboldt 2-1500

Along with higher rates, Subdirector Cesar reported 131 per cent more communities have telephone service than was the case in 1939; exchanges have increased by 140 per cent; there are 350 more long distance circuits, and twice as many telephones are in service. There are today 264,900 telephones in service throughout Mexico.

Telefonos plans to invest a total of 330 million pesos ($26,400,000) to increase the number of telephones in service to 336,000 in 662 communities. Telefonos now has 157,000 held orders for service.

The Atom's Constructive Uses

"In the first place, atomic power plants will use much the same equipment and facilities as coal-fired steam plants. We anticipate that the 'uranium boiler' will simply take the place of the coal boiler. The generators and transformers will be of the same types. The turbines may be essentially the same as those now being used. In the second place, the demands for electric power in the decades ahead will be so stupendous that every resource that is practical and available will be needed and used. Atomic power will enter the picture as another major source of energy, not as a replacement but as an essential supplement." — GWILYM A. PRICE, *president, Westinghouse Electric Corp.*

Answers to Traffic Questions On Page 41

(1) As directed by the calling party or at the end of two hours.

(2) Toll Credit Cards are issued on a yearly basis.

(3) The following information is entered on the toll ticket:

a. "bill to (place and tel. no. to which charges are to be billed)" entered in the "Special Instruction" space.

b. The credit card number is entered on the last line in the space for reports.

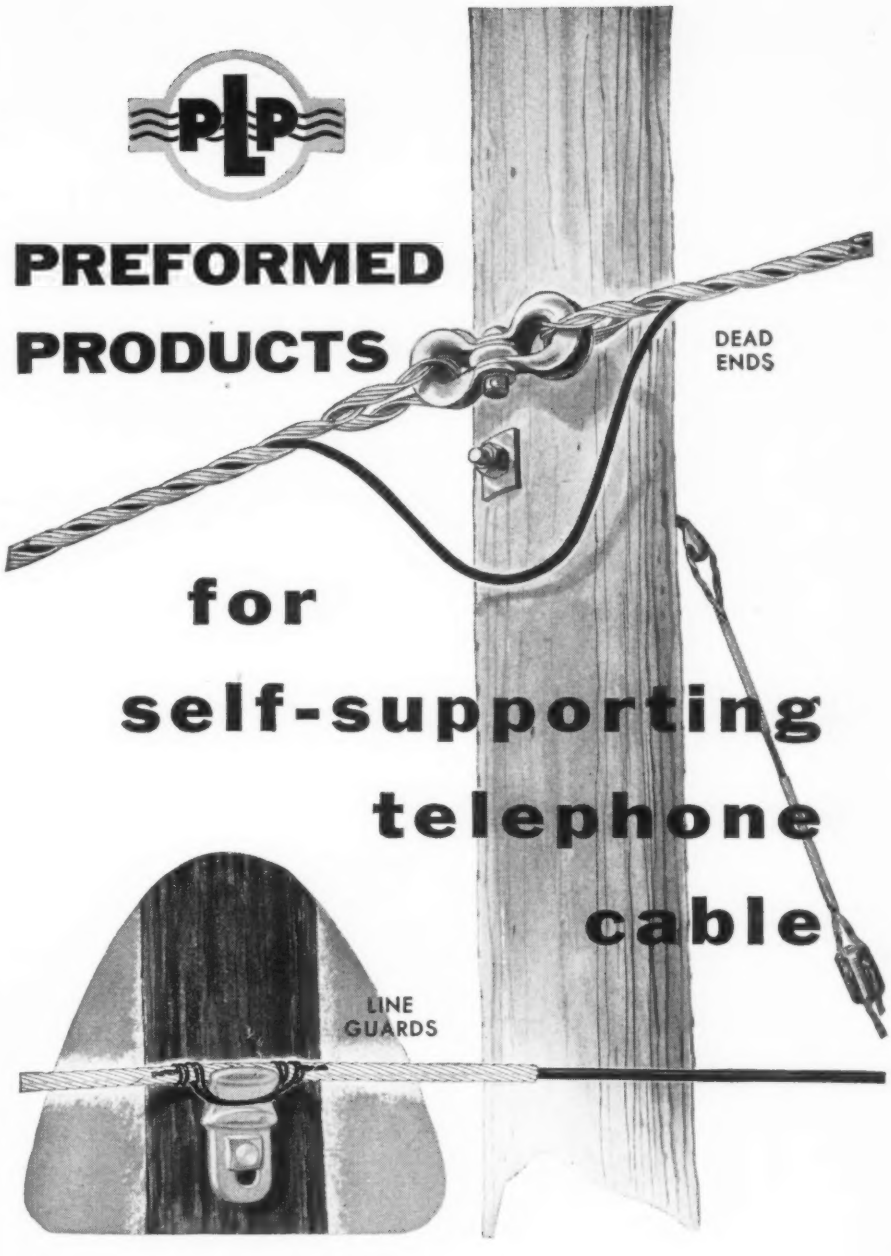
c. Enter in the usual way in the "FROM" and "TO" spaces the details concerning the telephones between which the parties will talk.

(4) Write in full all names of places and central offices and include the state abbreviations unless the states would be obvious.

(5) Connect the calling party with the supervisor or service assistant. However, for several weeks before and after Jan. 1, consider a card valid if the first digit corresponds to either year.

PLP

PREFORMED PRODUCTS for self-supporting telephone cable



PLASTIC insulated wires within a jacket are proving to have definite electrical and economical advantages. However, this thermoplastic insulation must not be subjected to concentrated stresses. Ordinary support fittings are not suitable for this type of cable. THE ANSWER: PLP Dead-Ends and Tangent Support Line Guards used as shown above protect while firmly holding cable in an elongated grip, in which the unit pressure is small because of the large area of the gripping surface. For details of their exclusive advantages, ask your Telephone Supplier or write us for Descriptive and Technical Data.

PLP

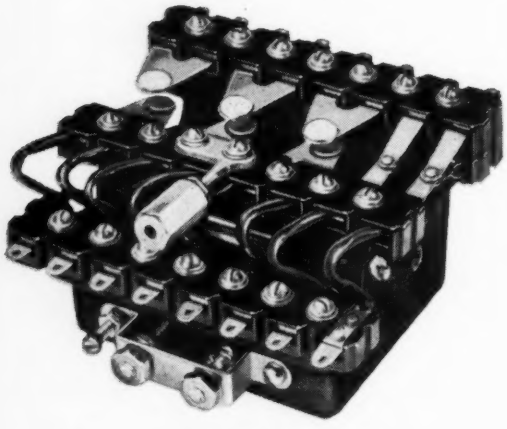
PREFORMED LINE PRODUCTS COMPANY
5349 St. Clair Avenue • Cleveland 3, Ohio

HEAVY DUTY

Multiple Arm

RELAYS
by SIGNAL

- Versatile — Rugged
- Cast Aluminum Base
- High Shock and Vibration Resistant
- Available AC — DC
- Contact Capacities Available 10; 35; 50 amp.
- Contact Combinations on Same Base
- Designed to Meet Many MIL Spec's



A superior relay that has endured the test of time . . . Specified for many years by America's largest manufacturer of electrical controls and communications equipment.

For complete data, write for Bulletin No. 30-4

Engineering representatives in principal cities

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Walltower Bldg. • Kansas City 6, Mo. • BA 6730

111 W. Monroe St. • Chicago 90, Ill. • RA 6-3688

Minnesota Association Studies Pension Plan

The Minnesota Telephone Association recently reported that officials of Retirement Plans, Inc., St. Paul, have been meeting with the association's pension committee, headed by Charles Cashel of Worthington, to prepare a report on the proposed pension program for employes of Independent telephone companies in the state.

The association's board of directors, at their September meeting, will receive a report from the pension committee and at that time will consider the merits of the plan.

Highway Trailer Appoints Hopkins Sales Manager

Harold J. Meagher, president of Highway Trailer Co., Edgerton, Wis., has announced the appointment of Ralph C. Hopkins to the position of sales manager of the company's utility division.

Mr. Hopkins matriculated at the University of Wisconsin and received his degree in mechanical engineering at the University of Connecticut. Before

R. C. HOPKINS

joining Highway Trailer Co., he was employed by United Aircraft Co. — Hamilton Standard Propeller Division —for five years as a field sales and service engineer and for 10 years by the Four Wheel Drive Auto Co., Clintonville, Wis., as a sales engineer and western sales manager. Mr. Hopkins also handled sales for the Eagle Mfg. Co. a subsidiary of Four Wheel Drive Auto Co., which manufactured products for the public utility and construction fields.

Highway Trailer Co.'s utility division sells its products to public utility companies and construction companies throughout the United States and in

the export field. The product line consists of utility truck bodies, earth boring machines, polo and cable reel trailers, winches, power take-offs and associated mechanical accessories.

W. F. Hafstrom Appointed To Post at Stromberg

William F. Hafstrom, former manager of sales, light military electronic equipment department, General Electric Co., Utica, N. Y., has been appointed assistant to S. R. Curtis, vice president—government contracts, at Stromberg-Carlson, a division of General Dynamics Corp. He assumed his new position on Aug. 1.

Mr. Hafstrom was born in Duluth, Minn., and attended the University of Wisconsin, where he graduated in 1939 with a B.S. degree in electrical engineering. Following graduation, he was employed in the standards department of the Marathon Paper Mills in Menasha, Wis., before joining the U. S. Signal Corps, which he served as an instructor at the radar school conducted by General Electric. Later he commanded a school established to teach the Signal Corps functions required in Air Force depot and service companies.

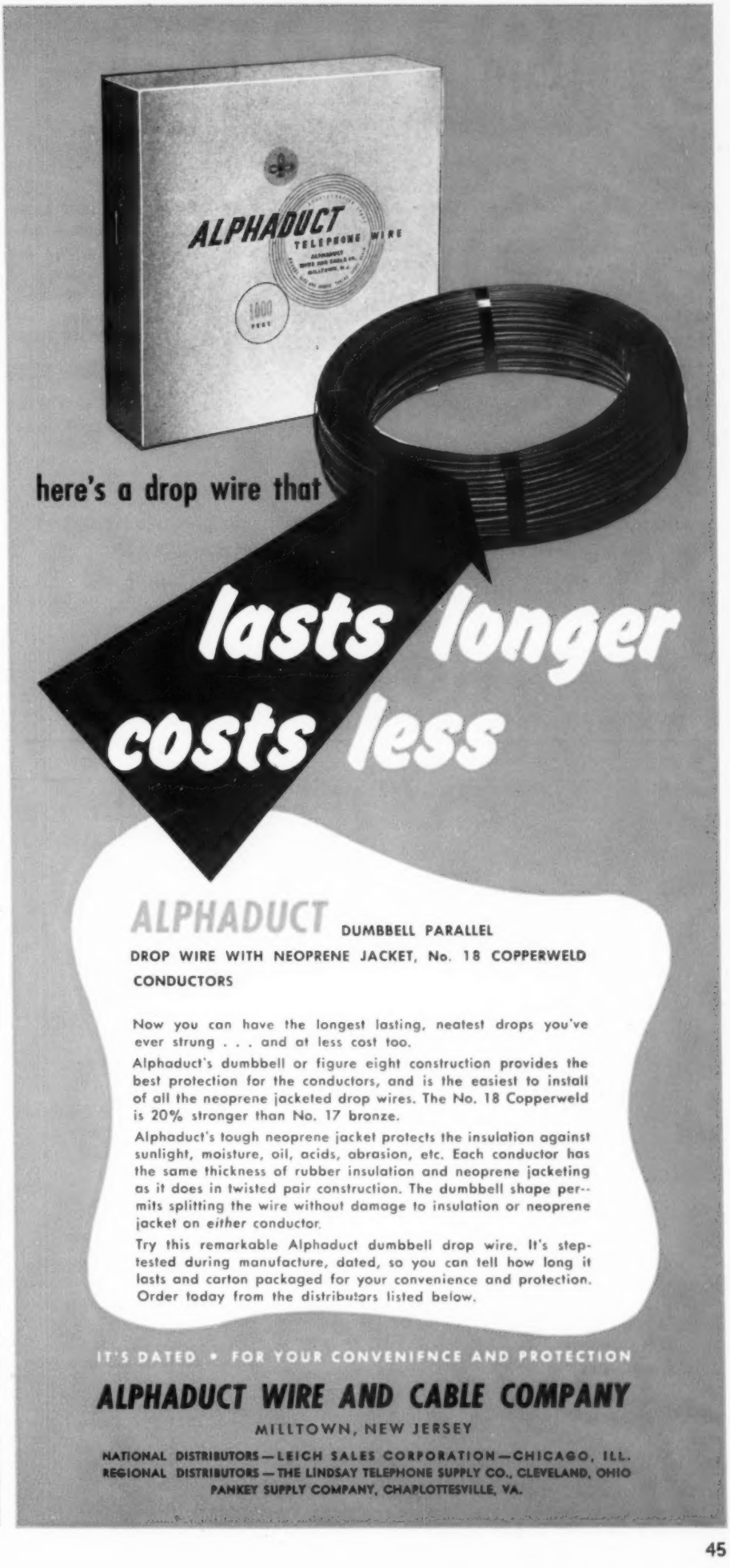
Upon retiring from service in 1943, he returned to General Electric and entered the government department of the electronics division as a sales engineer, from which he progressed to the position of manager of sales of the light military electronic equipment department in Utica, N. Y.

In 1953, Mr. Hafstrom was honored by General Electric in receiving the Coffin award for "his outstanding vision and persistence in establishing a program for the developing and marketing of airborne radar." This was the first such award given in the government marketing area.

Mr. Hafstrom is a member of the Institute of Radio Engineers, Institute of Naval Engineers, Air Force Association, and Armed Forces Communications and Electronics Association. He is also a member of Eta Kappa Nu, honorary fraternity of electrical engineers.

Point of View

"Research . . . is nothing but a state of mind—a friendly, welcoming attitude toward change; going out to look for a change instead of waiting for it to come. Research, for practical men, is an effort to do things better. . . . The research state of mind can apply to anything—personal affairs or any kind of business, big or little."—CHARLES F. KETTERING.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TELEPHONE WIRE
1000 FEET
here's a drop wire that
lasts longer
costs less
ALPHADUCT DUMBBELL PARALLEL
DROP WIRE WITH NEOPRENE JACKET, No. 18 COPPERWELD CONDUCTORS
Now you can have the longest lasting, neatest drops you've ever strung . . . and at less cost too.
Alphaduct's dumbbell or figure eight construction provides the best protection for the conductors, and is the easiest to install of all the neoprene jacketed drop wires. The No. 18 Copperweld is 20% stronger than No. 17 bronze.
Alphaduct's tough neoprene jacket protects the insulation against sunlight, moisture, oil, acids, abrasion, etc. Each conductor has the same thickness of rubber insulation and neoprene jacketing as it does in twisted pair construction. The dumbbell shape permits splitting the wire without damage to insulation or neoprene jacket on either conductor.
Try this remarkable Alphaduct dumbbell drop wire. It's step-tested during manufacture, dated, so you can tell how long it lasts and carton packaged for your convenience and protection. Order today from the distributors listed below.
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MILLTOWN, NEW JERSEY
NATIONAL DISTRIBUTORS—LEICH SALES CORPORATION—CHICAGO, ILL.
REGIONAL DISTRIBUTORS—THE LINDSAY TELEPHONE SUPPLY CO., CLEVELAND, OHIO
PANKEY SUPPLY COMPANY, CHAPLOTTESVILLE, VA.

Helpful Literature

CEDAR POLE HANDBOOK—Page & Hill Inc. recently announced that the fifth edition of their "Handbook of Practical Information about Cedar Poles—Their Preservation and Handling" is off the press.

Bound in a durable cover, the booklet has found wide use among telephone companies since the first edition was published in 1931, the company states.

Included in the Page & Hill handbook is information on accident prevention in unloading poles; carload and single pole weights, and on storage of poles; also instructions on framing, marking, painting or staining, and measurement of sweep or short crook in poles. American Standard specifications and dimensions are also given. Request HL243.

•

BATTERIES—C & D Batteries, Inc., has released their catalog, bulletin CP-538/55, covering the company's new line of Hi-Power batteries for use in the control, switchgear, emergency lighting and auxiliary power fields. Included in the bulletin are data on battery ratings and capacities, details of design and construction, dimensions, weights and types of containers. Request HL244.

•

HYDRAULIC JACK — A two-page descriptive bulletin has just been published on self-stowing hydraulic support jacks, manufactured by J. H. Holan Corp., jointly available through the company's manufacturing subsidiary, Holan Thrift Line Corp., and the company's Phoenix division.

The bulletin gives dimensional information and performance data and describes by diagram how the exclusive Holan self-stowing feature operates. Request HL245.

•

WIRE, CORD AND CABLE—A new 20 page illustrated catalog covering telephone wire, cord and cable is now available from the Whitney Blake Co.

This new bulletin, T-3, has sections on the company's Telecable polyethylene exchange area cable, inside wiring cable and rural distribution wires as well as Teleprene drop wires, inside and distributing frame wires.

Complete information on standard Telecord replacement cords and Koiled Kords retractile cords is also included. Request HL246.

•

PLIERS—Mathias Klein & Sons has produced a folder illustrating and describing the most popular pliers in the Klein line. This convenient folder, Bulletin No. 455, is indexed to facilitate use. Request HL247.

•

BATTERY CARE—Additional material is now available on storage battery selection, charging, handling, maintenance, inspection and testing for telephone service in the Plus-Performance Plan offered by Gould-National Batteries, Inc., Trenton, N. J.

Since the beginning of the Plus-Performance Plan in 1951, the company reports, battery users have improved battery performance and extended battery life as much as 50 per cent by following the suggestions contained in the collection of articles,

TELEPHONY

TELEPHONY PUBLISHING CORP.
608 S. Dearborn St.
Chicago 5, Ill.

Please have the manufacturer send me without obligation further information on the products described in the following numbers:

HL243____; HL244____; HL245____; HL246____; HL247____;
HL248____; HL249____; HL250____; HL251____; HL252____;
HL253____; HL254____; HL255.

Name ..... Title .....
Company .....
Street .....
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9/10/55

Linemen call this hoist a "HONEY"

Designed especially for line work

Here's a strong, fast-operating, light-weight hoist (12 pounds) with a flexible steel load chain that won't kink, bind or uncouple. Controls can be worked without removing gloves. It's rated to lift a one-ton load and it's tested to 3000 pounds.

ONE TON CAPACITY

THIS CHANCE HOIST HAS ALL THE FEATURES LINEMEN WANT

- Well-balanced, easy-to-grip handle. . . operates from either side
- "Free-wheeling" for ease in hooking to load . . . automatic locking control prevents accidental dropping of load
- Half link and full link take-up for accuracy and speed
- Easy working swivel hooks on both chain and hoist housing
- Permanently lubricated oil-ite bearings
- All working parts fully enclosed in the housing to prevent injury to fingers.

A·B·CHANCE CO·

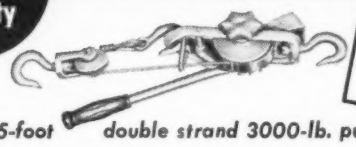
CENTRALIA, MISSOURI • SAN FRANCISCO, CALIFORNIA

ABC INDUSTRIES

CT55-2

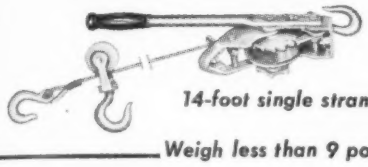
ACCO Quality

Wright Type "R" PULL-A-WAY



Write for Bulletin DH-163B

5-foot double strand 3000-lb. pull



14-foot single strand 1500-lb. pull

Weigh less than 9 pounds

Sturdy · Light · Safe · Economical

Here are some of the fine features of WRIGHT Type "R" Pull-A-Way: Drop forged ductile aluminum alloy frame • Wire hoist cable of maximum strength and flexibility • 8" minimum handle movement—for close hook-ups • 2" drum hub for cable • No oiling needed • Drop forged steel hooks • Removable, reversible "Safety Handle" that bends before any part of hoist is overloaded • Automatic load lowering, with positive control for safety • No slipping brakes • Low first cost • Simple, rugged repair parts easy to install ...factory service never required.

Write our York, Pa., Office for Bulletin DH-163A for full story

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HERE IS WHY:

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Circuits, transmitters, receivers, induction coils, generators, ringers, relays, line protection, dials, drop wire installation.

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Station installation, fault locating, circuit analysis, maintenance, testing outside plant, loading coils, etc.

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"Tops" IN THE MONEY-SAVING BRACKET

Especially adapted for carrier circuit construction

CASE ALUMINUM TRANSPOSITION POINT BRACKETS

Weighs about 4 lbs., complete with insulators. Save on maintenance; send for booklet fully describing the Case Aluminum transposition bracket.

Insulators come equipped with rubber bushings which maintain line circuit operation in event of breakage.

Catalog No.	Type	Wire Spacing	Wgt. Per C.
SE-1648	R.H.	8"	220
SE-1780	L.H.	8"	220
SE-1650	R.H.	6"	200
#1088	Glass Insulator (with bushing)		48
RC-1	Rubber Insulator		35

*The above brackets and insulators should be ordered separately.

Sold By Leading Distributors In The United States

Also Available

CASE ALUMINUM TRANSPOSITION SPAN BRACKETS

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P.O. BOX 214, ORANGE, N. J.

Consulting Engineers and Constructors

IN THE FIELD as in laboratory tests . . . ***Crapo*** Galvanized Steel Strand proves itself capable of withstanding severe punishment. Steel's inherent strength and durability are combined with definite economies in every size and grade of ***Crapo*** Steel Strand. You'll find the heavy, ductile, tightly-bonded zinc coatings, applied by the famous ***Crapo*** Galvanizing Process, provide lasting protection against corrosion.

Contact your jobber of *Crapo* Galvanized Products or write direct for further information!

INDIANA
STEEL & WIRE COMPANY
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Here's Safer, Easier Reel Handling

●Here's the reel jack that is strong and stable without hard-to-handle extra weight. An aluminum alloy housing reduces overall weight by 21 pounds, yet maintains full 10-ton capacity. "T" shaped laminated oak base gives solid, safe foundation. Single acting mechanism provides easier operation. Handles reels to 84" dia.; weighs 83 lbs. Furnished with 5' lever bar.

Write for full data on Reel Jack No. A-1029 and other Simplex Utility Jacks.

Pole Pulling and Straightening Jacks—Save time, cut work crews necessary to pull, straighten or move poles. No. A-1538 has aluminum housing, 15-tons capacity, weighs 63 lbs.

All-Purpose Jack — No. 310A lifts, pulls, pushes at any angle. Four lift points. 15-tons capacity.

WORLD'S LARGEST MECHANICAL AND HYDRAULIC JACKS
MFGRS OF INDUSTRIAL
SIMPLEX
RE-MO-TROL UTIL-A-TOOL **JACKS** JENNY ROL-TOE

TEMPLETON, KENLY & COMPANY
2557 Gardner Road, Broadview, Illinois

specifications, charts, record systems, manuals and bulletins which make up the plan. Request HL248.

•

RUGGEDIZED INSTRUMENTS — Weston Electrical Instrument Corp.'s new catalog A38B illustrates and describes the complete line of Weston approved, ruggedized and sealed-panel instruments in 1½-inch, 2½-inch, 3½-inch and 4½-inch sizes, ac, dc, RF and thermo, in both commercial and military types.

Instruments in sizes 2½-inch, 3½-inch and 4½-inch have an external zero corrector, and all instruments may be readily opened and resealed using only an ordinary screwdriver.

The catalog includes information on design and construction features, and on the test procedures employed to insure dependable accuracy in service under extremes of shock, vibration, temperature, humidity and general abuse. Request HL249.

•

LABORATORY STANDARD INSTRUMENTS—The Weston corporation also has announced that its laboratory standard instruments, and standard cells, are fully illustrated and described in a new catalog, A46A.

Also included is expanded information on frequency coverage, frequency compensation and wave form effect pertaining to the widely used Model 326 voltmeters, ammeters and wattmeters. Request HL250.

•

CARRIER AND MICROWAVE—Lenkurt Electric Co., Inc., has issued an illustrated report on its carrier and microwave equipment, titled "New Horizons in Communications."

The booklet describes the company's carrier and microwave equipment now in use and the research and development behind each.

The booklet also takes a brief look at the future of communications. Request HL251.

•

CLIPS AND INSULATORS—A new, revised catalog of the world's largest and only complete line of electrical and electronic clips and insulators has been issued by Mueller Electric Co.

The illustrated catalog covers all late revisions, including their many new miniaturized and special insulated clips. Request HL252.

•

MICROWAVE—A new Raytheon Mfg. Co. bulletin, No. 3-206, describes the Model TCR-12 Telelink, an automatic two-way telephone, telegraph, teletype and telemetering microwave communications system operating in the common carrier or industrial bands.

Designed to meet FCC standards, the TCR-12 is adaptable to meet either permanent or changing installation requirements. No modification is required for interconnection with most standard communications systems. Request HL-253.

•

HIRING PERSONNEL—Martin Publishing Co. has announced that it will send a copy of its booklet, "How to Hire Office Personnel," to anyone writing for it on a company letterhead.

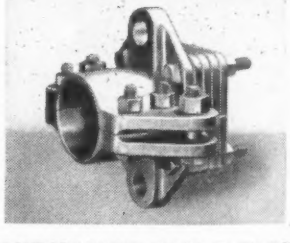
The subject is discussed under five headings: Recruiting, screening, testing, reference checking and interviewing. Request HL254.

•

ELECTRIC EQUIPMENT — Martindale Electric Co.'s catalog No. 30 is now available, the company states.

The 64-page booklet comprises sections devoted to: Production tools and equipment; commutator, motor, electrical and mechanical maintenance, and safety equipment. Request HL255.

product of the month



B SUBMARINE CABLE CLAMP

Used for anchoring wire-armored submarine cable. Clamps furnished in 2-, 3- and 4-inch sizes. Made of Dodge Steel Castings which clamp around the armored cable and clamp plates which secure free ends of armor wires. 2-inch clamp supplied with 2 sets of plates for terminating single armor. 3- and 4-inch clamps have 4 sets of plates. Wt. 2"—15 lbs.; 3"—31 lbs.; 4"—40 lbs.

PRICES FURNISHED UPON REQUEST

DS **DODGE STEEL CO.**
6501 Tacony Street, Philadelphia 35, Pa.

AE Names T. B. Collins Jr. Carrier Sales Manager

Automatic Electric Sales Corp. announces the appointment of Tate B. Collins Jr. as division manager for Independent telephone company carrier

T. B. COLLINS JR.

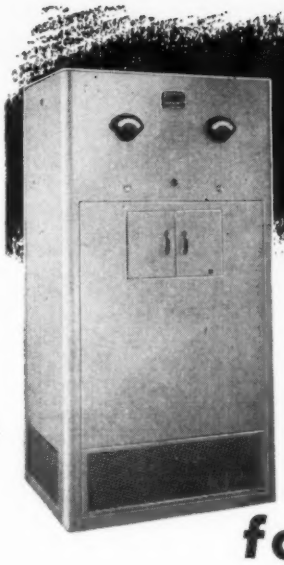
and radio sales. He will be succeeded as division manager for railroad and industrial carrier and radio sales by Jack B. Arnold.

Mr. Collins joined Automatic Electric in 1952 after 13 years of service with the transmission engineering group,

J. B. ARNOLD

Southern Bell Telephone & Telegraph Co. at Louisville, Ky. A veteran of World War II, Mr. Collins holds a reserve lieutenant colonel's commission in the Army Signal Corps. He is a graduate of Kansas State College, with degrees of B.S. and M.S. in electrical engineering.

Mr. Arnold, who joined Automatic Electric in 1948, has been staff engineer in the company's Rome, Italy,



ADD A FLOTROL

TO YOUR

ROTARY EQUIPMENT

for: • Better Voltage Regulation • Sizeable Power Bill Savings

A telephone exchange now using DC generators for charging the batteries can add one or more FLOTROLS and immediately obtain the precise voltage regulation characteristics of the FLOTROL for the entire exchange. The high efficiency of the FLOTROL will greatly reduce power consumption during those hours of the day when the FLOTROL alone is sufficient to carry the entire load; generators can be shut off during light load periods, thereby reducing the wear on the rotating equipment. By installation of FLOTROL capacity sufficient to carry the entire normal load, rotating equipment showing signs of wear can be saved for standby service, continuing its life indefinitely. The advantages obtainable from this type of installation are tremendous. For further information, send for Bulletin 161.

FLOTROL — PARTNERS IN DEPENDABILITY — SUB-CYCLE

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Fold up your derrick from inside the cab!

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TEL-E-LECT STORAGE KIT

The patented Storage Kit fits any standard utility truck body and "A" frame derrick and it can be quickly bolted on the back of your truck by your local mechanic. The derrick will go up or down in a minute or less, entirely controlled by the man in the truck cab. Working with a double drum winch, you get live boom operation—or easily adjustable derrick elevation with a single drum winch. The cost is only a fraction of other, more intricate derrick storing systems—and there's no rebuilding of your present equipment! *Write for details.*

Earth Boring Equipment for All Types of Trucks

TEL-E-LECT PRODUCTS, INC.
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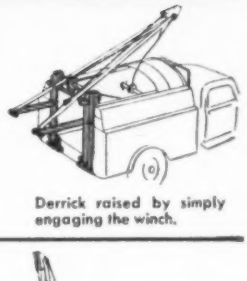
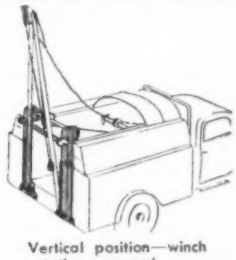
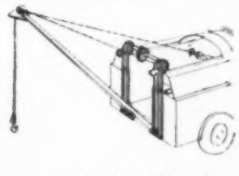
U.S. Patent No. 2,336,965.



Derrick raised by simply engaging the winch.



Vertical position—winch rotation reversed.



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NEW IRWIN 2-WAY "Hex" Shank Wood Bit

sectional view of 2-Way "Hex" Shank

fits both bit braces and electric drills

Use with hand brace as it comes. Order *without taper square shank*, or use hacksaw to convert to 2-Way "Hex" Shank for use in both hand braces and electric drills. It chucks perfectly—no wobble. Fast boring action speeds work. 2-way usage cuts inventory costs. Longer life cuts replacement costs. Hardened full length. Sizes 4/16 to 17/16". Call your mill supply distributor or hardware wholesaler for complete details.

IRWIN Wilmington, Ohio HEX SHANK WOOD BITS

headquarters for the past two years. Before that time, he was assistant to the president of Automatic Electric Sales Corp. Mr. Arnold is a graduate of Rensselaer Polytechnic Institute and the Harvard Graduate School of Business Administration. During World War II he served as a radar officer aboard a carrier in the Pacific, and is currently a lieutenant commander in the U.S. Navy reserve.

Kellogg Appoints W. D. Chase To Western Division

Announcement has been made by O. C. Bailey, assistant sales manager of Kellogg Switchboard & Supply Co., of the appointment of William D. Chase as sales representative in Kellogg's western division, covering the western Iowa and Nebraska territory. His home office will be the Kansas City office and warehouse.

W. D. CHASE

A graduate of Drake University, Des Moines, Iowa, Mr. Chase was formerly employed by Western Electric as editor of apparatus and circuits. He served in the Army during World War II.

Raytheon Mfg. Reorganizes Marketing Division

A reorganization of sales and service districts of Raytheon Mfg. Co.'s equipment marketing division was announced on Aug. 19 by Daniel J. Webster, marketing manager.

This reorganization establishes three new sales and service districts with headquarters in Baltimore, Md.; Atlanta, Ga.; and Kansas City, Kan. Headquarters for other sales and service districts are in Boston, New York, New Orleans, Cleveland, Chicago, Seattle and Los Angeles.

Managers for the three new districts will be Roger Mackay, Atlanta; Edward Keesler, Baltimore and W. J. Monroe, Kansas City. Other new district manager appointments include Joseph C. Profita, Chicago; Emile J. Rome, New Orleans, and Howard H. Ganson Jr., Seattle.

"With this new district organization, Raytheon is better able to serve the local markets within each district," said Mr. Webster. This includes local markets for Raytheon marine electronic equipment; microwave communication equipment; sonic, ultrasonic, welding and magnetizing production tool equipment, and the complete line of Raytheon custom and standard design electronic transformers and components.

In addition to handling direct sales, the district sales and service offices will continue as headquarters for more than 500 distributor and dealer outlets throughout the United States.

No Time to Stand Still

"More than any other kind of man, the American knows the truth that you can never stay where you are—or, at least, you have to run swiftly to stay where you are. You go up or down, forward or backward—you do not, you cannot stay put. . . . We are a nation on the march."—HENRY R. LUCE, *editor-in-chief, Time, Inc.*

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